Investigating the benefits of women's groups in Malawi: adapted quality of life measurement, best-worst scaling choice-experiments and contingent valuation

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Abstract

This Ph.D. aims to investigate how women's groups, aimed at reducing maternal and neonatal mortality in Malawi, affect quality of life. Quality of life was measured in 534 women, comprising 179 women's group members in 36 different communities, 174 non-members in the same communities and 181 women in 36 control communities. The WHOQoL-BREF, a 26-item questionnaire developed by the WHO to measure quality of life from a broad perspective, was used. The WHOQoL-BREF has the following six domains: overall quality of life, overall health, physical, psychological, social relationships and environment; and is compatible with the capability approach of economic evaluation. It was first translated into Chichewa, the main local language of Malawi, and validated for future use as part of this Ph.D.. This Ph.D. also makes methodological contributions via adaptation of Discrete Choice Experiment best-worst scaling exercises for use in poor rural communities; and adapting Contingent Valuation techniques using time and maize flour as alternative payment methods to money. The choice experiments were employed to provide relative preference-weights to each WHOQoL-BREF attribute as an alternative to respondents indicating how important each attribute is on a scale not requiring them to trade-off attributes against each other. The results of the choice experiments were modelled using the newly-developed Sequential Best-Worst Multinomial Logit Model. The Contingent Valuation study contributes empirical data on whether, how much, and why the women in the three study arms value the women's group intervention. This Ph.D. also explores philosophical, political, psychological and economic literature surrounding measurement of quality of life, decision-making, economic evaluation and allocative efficiency. It hopes to contribute toward valuation of women's groups in Malawi, and, more broadly, toward methods of cost-benefit analysis of health interventions in low-income countries via the consideration of non-health costs and benefits.

Acknowledgements

Firstly, I would like to thank my brilliant supervisors: Jolene for taking me on in the first place, and being a great help throughout, especially during the latter stages; and Shepley, for many illuminating conversations. You have both inspired me, and piqued my interest in health economics and related subjects. I would also like to thank Emily Lancsar, who has been an indispensable help with the choice modelling and other thorny econometric issues I am not (yet) entirely cut-out for; and James Beard who helped me with the programming of the PDAs for data collection. Special thanks goes to Anthony Costello for hiring me and continuing to involve me in many interesting other projects as an epidemiologist. I also thank Ruth Gilbert at ICH for her original belief in me, which turned the tide of 35 previously unsuccessful job applications following my Master's degree. Without her I would not be where I am today. Special thanks also to my late brilliant grandfather Brian Crozier for financing my Master's, without his support I also would not be where I am today. My Ph.D. would also have been impossible without the support of all the staff at MaiKhanda and PACHI. You have all helped me and taught me a lot about working in challenging settings. Special thanks to Gibson, for managing, even in difficult times.

Special thanks also to everyone who took part in the study. I hope in some very small way this work may help.

My four and a half years in Malawi would have been much less enjoyable, and much harder without Bejoy and Mahima, who provided me with a place to stay during my initial and final months, great company, and plentiful tasty food. Nimaye and Neil also provided plenty of entertainment and helped ensure I was never bored. Bejoy has also been, and continues to be, a great collaborator. Living in Malawi was also greatly enhanced by my amazing housemates, especially Colin, Astrida, Olivia, Stephanie, Sarah and Antje. I would also like to thank our guards John, Richard, Fred and Philemon for keeping us safe, and Philemon also for keeping things clean. Thanks also to Chiro for being a crazy dog.

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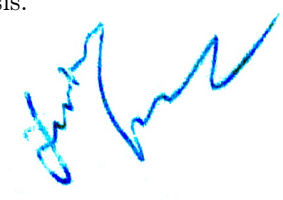
Finally, I would like to thank my Mum, Dad, sister Chrissie and brother Greg for being such a great family, and for visiting me in Malawi. Special thanks also goes to my Mum for proof reading and editorial assistance, and to Greg for the millions he is going to give me from the profits of his 3D-printing business that I helped him finance.

Declaration

I, Timothy Edwin Colbourn, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.



Preface

This thesis is organised as follows. The introduction, chapter 1, presents the background to the research, including discussions of relevant literature and theory and why the research is justified. The thesis is then organised into three parts: quality of life measurement; quality of life valuation and willingness to pay; and, discussions and conclusions. Part 1 contains three chapters: chapter 2 on the philosophy, theory, history and current practice of quality of life measurement and in particular the WHOQoL-BREF; chapter 3 on the translation, validation and adaptation of the WHOQoL-BREF for use in Malawi (the 'pilot study'); and chapter 4 which examines differences in quality of life (as measured by the WHOQoL-BREF) between women's group members, non-members in the same village, and women in control-area villages (the 'main study'). Part 2, also containing three chapters, then examines the use of discrete choice experiments to value the different aspects of quality of life measured by the WHOQoL-BREF and the use of contingent valuation to estimate both women's group members and non-members willingness-to-pay for the women's groups intervention. Chapter 5 reviews the theoretical and design issues around discrete choice experiments, with special reference to the literature on bounded rationality, adaptive decision-making, heuristics and biases. Chapter 6 then presents the discrete choice experiment study, which was undertaken using best-worst scaling. Chapter 7 then presents the contingent valuation study. Finally, part 3, containing chapter 8, attempts to bring the whole thesis together with reference to economic evaluation and health and social policy. Chapter 8 links the different strands of empirical work laid out in the previous chapters, before leading on to more general discussions of economic evaluation and allocative efficiency, and continuing with an overview of the limitations of measurement systems aimed at these tasks. The thesis then ends with a section sketching potential ways forward and concluding thoughts.

A host of relevant additional information is then included in extensive appendices. Despite their large number, all 22 appendices are supplementary material and not required for a full understanding of the thesis. I have included all of them for three reasons. Firstly, so that a complete record of all of the work undertaken in this thesis is included in a single volume. Secondly for the interested reader to learn more about the context within which the research took place. Finally, so that all of the analyses are replicable and fully open to scrutiny.

This thesis was completed between 2008 and 2012, part-time; the timeline is provided as Figure 1.4 on page 28, discussed in § 1.6 on page 27 (please note that throughout this thesis § refers to a numbered section of the text). A summary of my training and professional development, required as part of a UCL doctorate, including attendance of courses and conferences, fieldwork,

grant applications, and writing and reviewing research papers is provided as Appendix A.

Figure 1 provides a visual overview of the main empirical and methodological contributions of this thesis along with signposting to relevant chapters. As hinted at in the left column of the figure the following four peer-reviewed journal articles are anticipated. The first has recently been published.

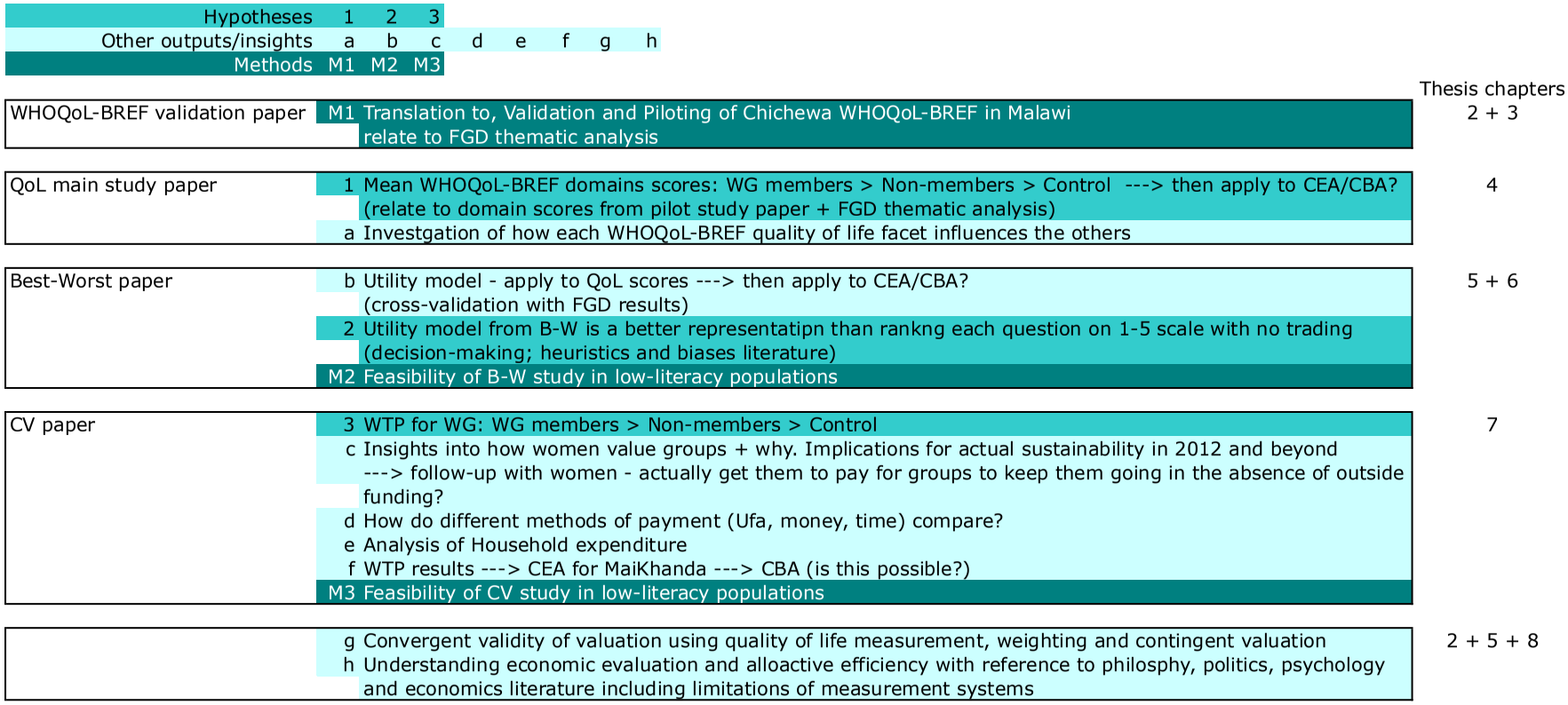
- Colbourn T, Masache G, Skordis-Worrall J. 2012. Development, Reliability and Validity of the Chichewa WHOQoL-BREF in adults in Lilongwe, Malawi. *BMC Research Notes* **5**:346
- Colbourn T, Masache G, Orr S, Skordis-Worrall J. 2013. Do women's groups aiming to reduce maternal and neonatal mortality in Malawi also improve quality of life as measured by the WHOQoL-BREF? Target journals: Quality of Life research; Malawi Medical Journal
- Colbourn T, Lancsar, E, Orr S, Masache G, Skordis-Worrall J. 2013. Best-Worst Scaling Discrete Choice Experiments to determine how rural women in Malawi value quality of life as measured by the Chichewa WHOQoL-BREF. Target journals: Health Economics, Journal of Choice Modelling
- Colbourn T, Orr S, Masache G, Skordis-Worrall J. 2013. How much do rural women in Malawi value participatory woman's groups aiming to reduce maternal and neonatal mortality: results from a Contingent Valuation study. Target journal: Health Economics

Additional publications may be developed from nascent work on the interactions between capabilities, detailed in Chapter 4, and from comparisons of the work undertaken in this thesis with other sites in Malawi, and perhaps other countries.

This Ph.D. constitutes part of the evaluation of the MaiKhanda women's groups (see Chapter 1). As such, I had access to MaiKhanda resources, including well-trained field workers to collect data and oversee conduct of the work detailed here. In addition to MaiKhanda resources I have also been helped by resources of the Parent and Child Health Initiative (PACHI), including field interviewers. The work presented in this thesis, however, is entirely my own, as are any remaining mistakes.

Tim Colbourn
London
7th October 2012

Figure 1: Key outputs of Tim Colbourn's Ph.D.



Ethics

Ethical approval was granted for this study both in Malawi by the National Health Sciences Research Council (NHSRC): (Protocol #696) and in the UK by UCL (Project ID: 2105/001). All respondents gave informed consent prior to being included in the study. The letters of ethical approval are reproduced as Appendix B on page 281. The information sheets for the study, and the informed consent forms are reproduced in Appendix C.

Funding

Funding for this study was provided by The UK Department for International Development (DFID), the Wellcome Trust and The Health Foundation (see Appendix J for detailed budgets). Tim Colbourn's full-time job as a research assistant at UCL, held whilst undertaking this Ph.D. part-time, was funded by The Health Foundation until 31st January 2012, and then by the Bill and Melinda Gates Foundation, European Union, DFID and the Wellcome Trust for the final months.

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Acronyms and Abbreviations

BWS	Best-Worst Scaling
CBA	Cost-Benefit Analysis
CEA	Cost-Effectiveness Analysis
CIHD	(UCL) Centre for International Health and Development
CUA	Cost-Utility Analysis
cv	(Hicksian) Compensating Variation
CV	Contingent Valuation
DALY	Disability Adjusted Life Year
DCE	Discrete Choice Experiment(s)
DFID	(UK government) Department for International Development
EE	Economic Evaluation
EHP	Essential Health Package
EUT	Expected Utility Theory
FGD	Focus Group Discussion
GDP	Gross Domestic Product
HPI	Happy Planet Index
HSSP	Health Sector Strategic Plan (2011-2016, Malawi government)
ICER	Incremental Cost-Effectiveness Ratio
ISRCTN	International Standard Randomised Controlled Trial Number
IUF	Indirect Utility Function
MCDA	Multi-Criteria Decision Analysis
MNL	Multinomial (conditional) Logit
NGO	Non-Government Organisation
NHSRC	National Health Sciences Research Council

NICE	(UK) National Institute for Clinical Excellence
OLS	Ordinary Least Squares (regression)
ONS	Office for National Statistics (UK)
OR	Odds Ratio
PACHI	Parent and Child Health Initiative (Lilongwe, Malawi)
PDA	Personal Digital Assistant
PTO	Person Trade Off
q	WHOQoL-BREF question
QALY	Quality Adjusted Life Year
QoL	Quality of Life
RCT	Randomised Controlled Trial
RUT	Random Utility Theory
SEM	Structural Equation Model
SG	Standard Gamble
SWB	subjective well-being
TBA	Traditional Birth Attendant
TTO	Time Trade Off
UCL	University College London
UK	United Kingdom of Great Britain and Northern Ireland
VAS	Visual Analogue Scale
VBP	Value-Based Pricing
WG	Women's Groups
WGF	Women's Group Facilitator
WHO	World Health Organisation
WHOQoL-100	WHO Quality of Life questionnaire (100 questions)
WHOQoL-BREF	WHO Quality of Life questionnaire - short form (26 questions)
WTP	Willingness To Pay

Chapter 1

Introduction

This chapter presents both the context within which this Ph.D. research took place, and a justification for the specific studies and methods that were the focus of the research.

1.1 Malawi and MaiKhanda

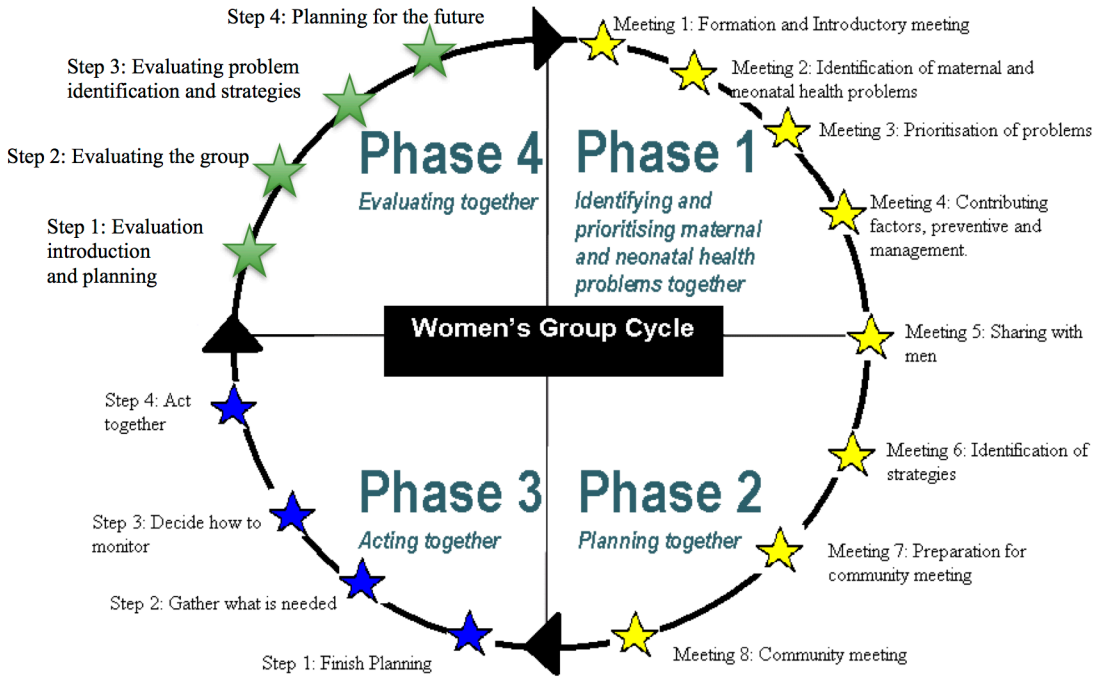
This Ph.D. is part of the broader evaluation of a maternal and neonatal health programme in Malawi, called MaiKhanda (Institute for Healthcare Improvement et al., 2005). MaiKhanda, wholly-funded by the London-based Health Foundation, was initiated in May 2006[1] with work on the quality improvement of care at nine comprehensive emergency obstetric care hospitals within Lilongwe District. In 2007 MaiKhanda set up village-based women's groups (WG, described below) in the rural areas of Kasungu, Lilongwe and Salima Districts, aimed at the improvement of maternal and neonatal health through community participation, mobilisation and empowerment (Rosato et al., 2008). Subsequently, the quality improvement programme commenced in 32 health centres within these same districts. The two interventions (Women's Groups and Quality Improvement) were evaluated in a factorial cluster Randomised Controlled Trial (RCT) designed by the UCL Institute of Child Health (2007), specifically Costello et al. (2005). This Ph.D. constitutes a link between the process evaluation (Nambiar et al., 2007) and the economic evaluation (Colbourn, 2008) of the MaiKhanda women's group intervention, which were both conducted by CIHD alongside the RCT impact evaluation. As will become apparent below, its focus on quality of life and how women value the intervention, sets it apart from either of these evaluations, however.

1.2 The MaiKhanda women's group intervention

Volunteer Women's Group Facilitators (WGF) each form nine women's groups in local villages in rural Malawi in order to discuss maternal and neonatal health problems and empower group

[1] The name MaiKhanda was not adopted until early 2009 when a Malawian NGO with the name MaiKhanda was registered; previously the programme was known as The Health Foundation Consortium (THFC)

Figure 1.1: The MaiKhanda women's group action cycle



members and the wider village community to decide upon local solutions/advocate and lobby for alternatives. Typically containing 10-30 members, each group will hold eight monthly meetings, discussing maternal and neonatal problems and strategising solutions. Strategies are then implemented and evaluated by the group. The cycle of meetings, implementation and evaluation (Figure 1.1), can then recommence.

1.3 Reduction of maternal and neonatal mortality

The initial aim of MaiKhanda was to measurably reduce Malawian maternal and neonatal mortality over 5 years (Institute for Healthcare Improvement et al., 2005). MaiKhanda aimed to significantly reduce both maternal and neonatal mortality over a 3-year period, where the roll-out of the interventions enabled their evaluation in a Randomised Controlled Trial (RCT) design (UCL Institute of Child Health, 2007; Costello et al., 2005). The RCT found the women's group intervention to reduce perinatal mortality by around 16% and the women's group and quality improvement interventions combined to reduce neonatal mortality by 22% (Colbourn et al., 2012b,c).

1.4 Other benefits and costs of the women's groups

Apart from the reduction of maternal and neonatal mortality it is likely the women's group intervention will have had other health and non-health benefits. Such benefits include individual

and community empowerment, increased social well-being and quality of life. But the women's group intervention may also have had non-health costs, like the undermining of traditional birth culture, and any costs paid by the women themselves due to membership of the women's group.

Non-mortality benefits and costs of participatory community interventions such as the MaiKhanda women's groups could be very broad. Possible attributes of the WG intervention (including all likely benefits and costs) were determined by formative research asking key informant experts and MaiKhanda staff to consider all the inputs, processes and outputs of the intervention and asking Malawian women in focus group discussions (FGD) for their understanding of the attributes of the WG intervention to corroborate this information and ensure ecological validity. The resulting 166 attributes (Appendix D) were combined and grouped into themes and sub-themes. The list was then converted into a model of the functioning of the women's groups in terms of inputs, processes and outputs specific to individual women, women's groups, and other community members, which also highlights the core and optional outputs of the groups (Figure 1.2). Several methods can be used to measure the benefits and costs identified by the formative research. After consulting the literature and considering the advantages and disadvantages of available methods for measuring total benefits and costs of an intervention (Table 1.1), and considering the large scope of potential benefits and costs (Figure 1.2) the investigation and measurement of all of them was considered to be too large an undertaking for this Ph.D.. Instead, a primary focus on quality of life was chosen, for its intrinsic value and the fact that all benefits and costs should affect quality of life in some way (explained in detail in §2), and also for its potential application in cost-benefit analysis.

1.5 A focus on quality of life and contingent valuation

The aims of this Ph.D. were to identify and measure any quality-of-life related benefits and costs of the women's group intervention and to understand how the women value the women's groups. In total, I decided to focus the study on the use of three methods. The first being measurement of quality of life using the WHOQoL-BREF (shortened version of the WHO Quality of Life instrument)(WHO, 1998), see §2.2.3 and §2.3 for detailed explanations on the rationale behind, and applications of, the use of the WHOQoL-BREF; and, §3 and §4 for empirical results of it's use. The second method was valuation of the different quality of life states measured by the WHOQoL-BREF via Best-Worst Scaling (BWS) Discrete Choice Experiments (DCE), see §5 for the theory, rationale and literature review related to DCE, and §6 for the use of DCE in this study. The third method was Contingent Valuation (CV), see §5.5.3 for a brief rationale and §7 for the empirical study. Cost consequence analysis was not chosen as it neither accounts for individual preferences nor allows for comparison of specific externalities. Measurement of quality of life from a broad perspective (the WHOQoL-BREF) was chosen as it is likely to capture a lot more of the benefits of the women's group intervention, which is a complex health and development intervention likely to have many effects beyond improvements in health and reduced mortality (Colbourn et al., 2012c; Rosato et al., 2008; Tripathy et al., 2010). The rationale for this focus is extensively explained in the following

Figure 1.2: Model of the attributes (potential benefits and costs) of the Women's Group intervention

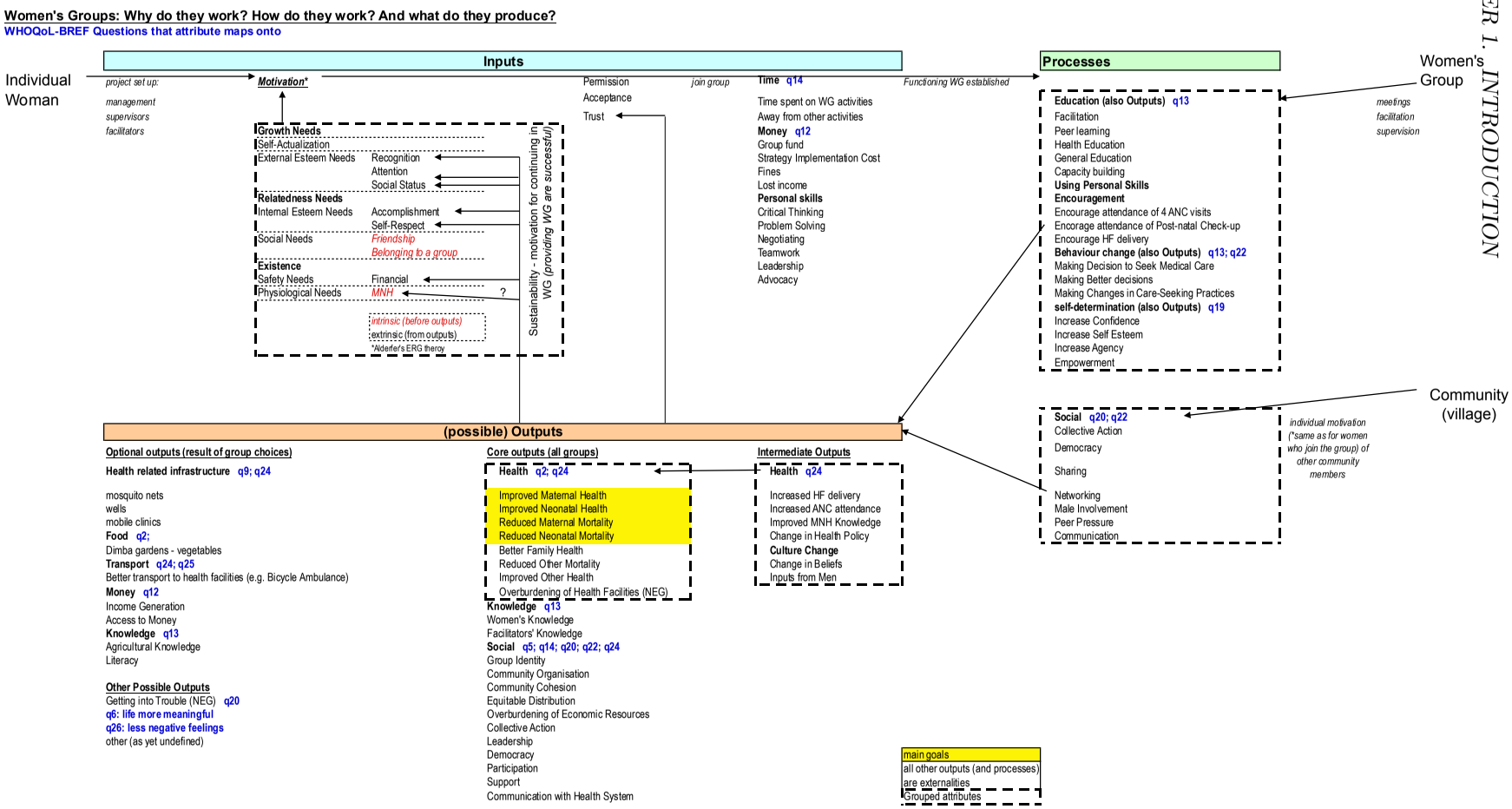


Table 1.1: Methods for measuring the total benefits and costs of health interventions (Drummond et al., 2005)

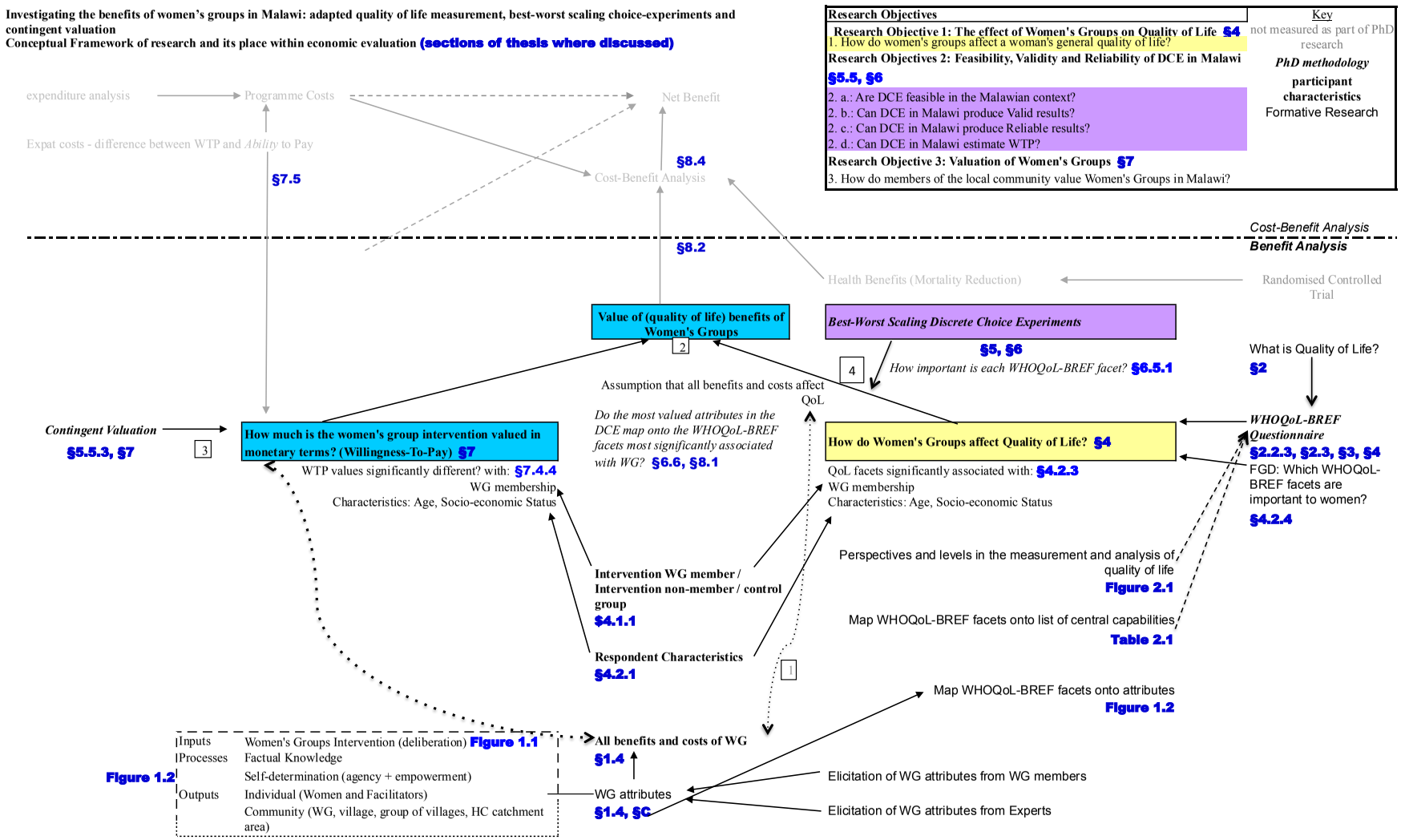
Method	Description	Advantages	Disadvantages
Cost Consequence Analysis	All benefits and costs are listed and a decision is made by experts as to what the overall net benefit may be.	-Does not require experimental methodology	- Inability to directly compare the benefits and costs - Lack of information on the stated preferences of individuals - Results biased by experts' opinions.
Contingent Valuation method (estimation of Willingness To Pay)	Individuals are asked to place a monetary value on the intervention (implying they have considered all of the benefits and costs as well as the intended effects of the intervention)	- Takes individual stated preferences into consideration - Potential for overall net benefit to be determined	- Not possible to value specific benefits and costs separately, or to directly compare them. - Individuals often find it difficult to directly place a monetary value on health as is required by this method
Discrete Choice Experiments	Individuals are asked to choose between hypothetical alternative interventions with different benefits and costs (attributes) in order to determine the value of each in relation to each other and/or money.	- Takes individual stated preferences into consideration with reference to specific benefits and costs - Individuals have to trade-off between attributes, therefore increasing validity of comparison of attributes - Potential for overall net benefit to be determined if money is included as an attribute	- Time consuming - Requires fieldworker assistance and more time to be completed by illiterate people - Possibility of biased results given multitude of issues affecting the reliability and validity of the method.
Quality of Life questionnaire	Individuals are asked to rate different aspects of their lives in order to determine their overall (health and non-health related) quality of life. By comparing individuals encompassed by the intervention with those who are not, a measurement of the benefits and costs in terms of how they relate to quality of life can be made.	- Cross-culturally valid questionnaires are available (WHOQoL) - all benefits and costs should be captured by their effect on quality of life	- Requires fieldworker assistance and more time to be completed by illiterate people.

chapter (§2). The WHOQoL-BREF was first translated and validated for use in Malawi, as detailed in §3, before it was used to investigate the benefits of the women's groups in §4. Discrete choice experiments were chosen as a method to weight the different quality of life attributes measured by the WHOQoL-BREF, because they require respondents to trade-off the different attributes enabling perhaps better measurement of preferences than simple independent rating of each attribute on a 1-5 rating scale (the default option that allows all to be scored as, say, a 5). Relevant background literature concerning DCE is discussed in §5; and the design and application of DCE in this thesis is presented in §6. Contingent valuation was chosen in order to pursue an alternative method of investigating the benefits (and costs) of the women's groups, the estimation of willingness to pay for the intervention being a proxy for all of the benefits and costs of the women's groups pertinent to the respondents. The design, conduct, results and discussion of the contingent valuation study is presented in §7. The participants in all three main parts of the study were randomly selected women's group members, non-members in the same village and women in control area villages, as explained in detail in §4.1.2.

The measurement of the WG intervention benefits and costs using these methods is shown in Figure 1.3 in the context of investigating the value of the (quality of life) benefits of the women's groups from the perspective of local beneficiaries and, more broadly, in the context of a potential cost-benefit analysis. This conceptual framework is a good overview of the work undertaken for this Ph.D. (note that the section numbers of each part of the work are provided in blue) and how it fits in with the broader evaluation of the WG intervention I am also involved in (Colbourn et al., 2013). Figure 1.3 shows how the chosen methods of quality of life measurement and preference weighting by DCE, and contingent valuation, are complementary and how they could be combined to build a rich picture of how local Malawian women value the women's group intervention. Specific analytic and methodological challenges are highlighted in this figure, along with an overview of the main research questions (colour coded), and different categories of the research, including formative research, methodology, and characteristics of the study participants. Briefly, the formative research described above in the second paragraph of this section, Figure 1.2, and Appendix D, give an idea of all of the potential costs and benefits of the women's groups, which can then be thought of in terms of quality of life, measurement of which was pursued using the WHOQoL-BREF, weighted by the DCE (right hand side of the figure). Alternatively, all of the benefits and costs of the women's group could be captured in an estimate of how much the women are willing-to-pay to keep the women's group intervention going (left hand side of the figure). Combining the two pathways of assessing the value of the women's groups may be problematic, though, if done, could perhaps inform a cost-benefit analysis that is beyond the scope of this thesis. Research questions related to how the women's groups affect quality of life, the feasibility of conducting DCE in Malawi, and the monetary value local women place on the groups were all pursued. However, various issues affect all of the methods, and especially the contingent valuation and DCE.

It should be remembered that, once encapsulated in the economic evaluation, the additional non-health benefits and costs pose a challenge as they fall outside the traditional remit of the health sector (Drummond et al., 2008b). It will be necessary for intersectoral dialogue

Figure 1.3: Conceptual Framework of Ph.D. research



Analytic and Methodological Challenges

1 The total value of the benefits and costs of the Women's Group intervention obviously depends on the amount of each benefit and cost the intervention causes, the quantification of which is beyond the scope of this thesis.

2 The welfarist and extra-welfarist foundations of the contingent valuation and the quality of life measurement, respectively are incompatible in that the former will measure current preferences for the women's group intervention, whereas the latter will measure current capabilities (and functionings), albeit weighted by DCE, which are welfarist in that they seek current preferences for the different area of quality of life (capabilities and functionings). §8.2

3 The way the contingent valuation task is designed including the information given to respondents (especially those who are unfamiliar with the intervention) will affect the estimate of Willingness To Pay they give. Framing and anchoring effects especially have to be avoided and the contingenet valuation scenario must be realistic to ensure incentive compatibility. §7.2, §7.3, §7.5

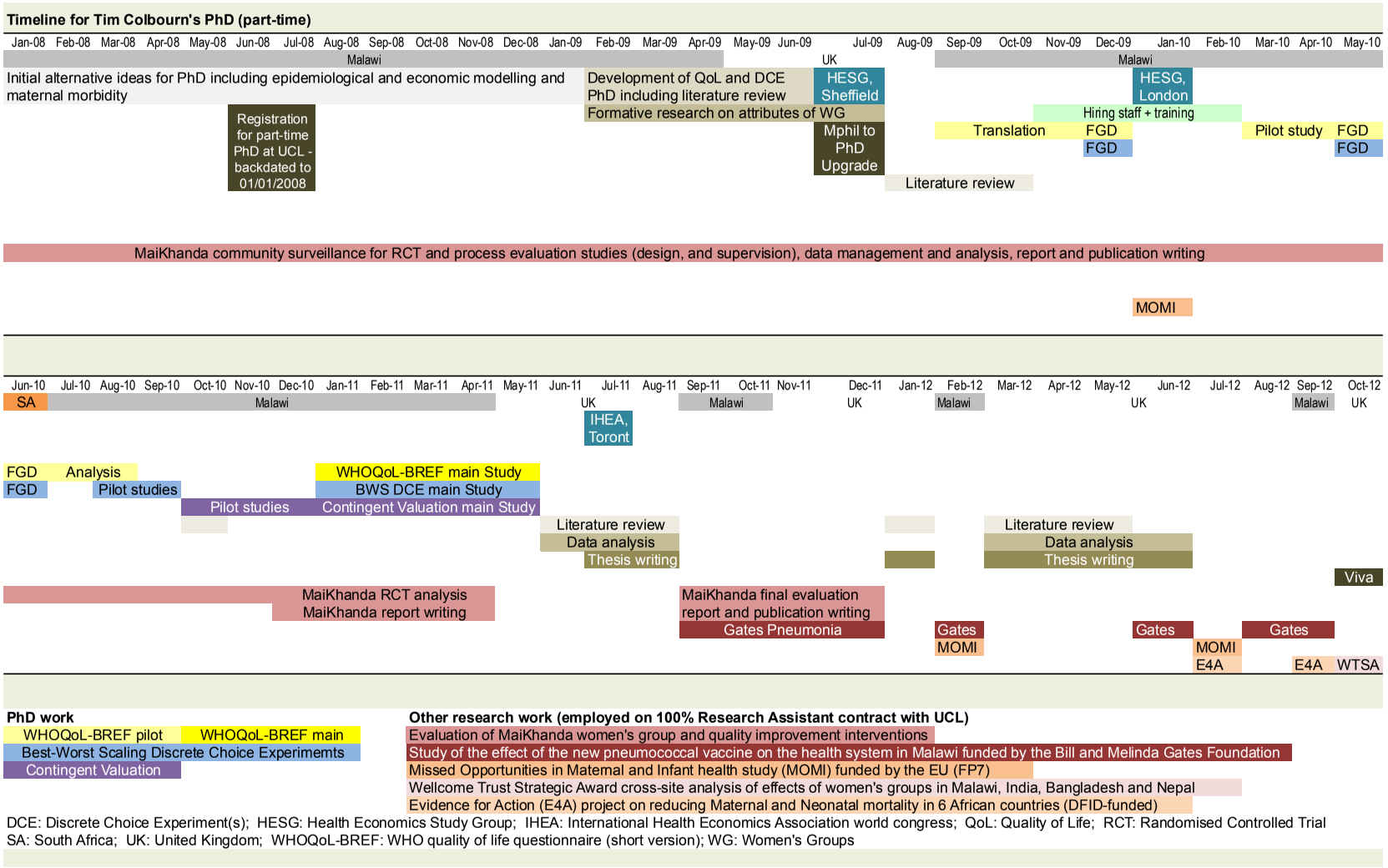
4 The DCE are especially vulnerable to respondent heuristics, biases and other non-trading behaviour that does not conform to the rational economic model of random utility theory that underpins them. Therefore, the results of the DCE may not be a true reflection of the preferences of the respondents with respect to the different quality of life facets. §5.4, §6.5, §8.6

among policy-makers whose remit includes the non-health benefits and costs. Ultimately, the perspective on costs in economic evaluations of public health interventions should encompass the whole public sector, rather than just the Ministry of Health (NICE, 2006). In a cost-benefit analysis framework, public health interventions could then be compared to other public sector interventions. Although cost-benefit analysis may be undertaken as part of the broader economic evaluation of MaiKhanda that I am involved in (see Figure 1.3), it will not be part of this Ph.D.. However, it is discussed, partly with respect to the work undertaken in this thesis, but also with respect to broad theoretical and methodological considerations, and policy applications, in the final chapter of this thesis (§8).

1.6 Overview and Timeline

As described above the main components of my Ph.D. research were measurement of quality of life using the WHOQoL-BREF, valuing the quality of life facets and levels using BWS DCE, and valuing the whole women's group intervention using Contingent Valuation. All three of these main areas of empirical work involved pilot studies and both qualitative and quantitative data collection and analysis. In addition, literature reviews on relevant aspects of quality of life, psychology and behavioural economics, and economic evaluation for health and social policy, were conducted. Figure 1.4 shows the timeline of my Ph.D., highlighting the different stages of each of the three main areas of empirical work as well as literature review, data analysis and thesis writing. Key events such as conferences and milestones are also included, as is, for perspective, a summary of my additional research work, conducted concurrently with my Ph.D. work.

Figure 1.4: Timeline



Part I

Quality of Life measurement

Chapter 2

Quality of life: theory, measurement and the WHOQoL-BREF

This chapter begins with a discussion of the concept of quality of life and reasons for measuring it, focusing on the evolution of theoretical underpinnings of the concept from moral and political philosophy, including welfarism and utilitarianism, the equality of primary goods (Rawls' theory of justice), the capability approach and criticisms and extensions of each. I then briefly review measurement of quality of life, focusing on health-related quality of life and quality of life more generally, and, finally on the development of the WHOQoL-100 and its short-form version, the WHOQoL-BREF, used in my study. The relevance of the WHOQoL-BREF to measurement of rural Malawian women's quality of life, the focus of my study, is also discussed, as are other applications of the WHOQoL-BREF with reference to the theoretical frameworks for measuring quality of life discussed earlier.

2.1 What is quality of life? And why is it important?

This section begins with a presentation and discussion of various definitions of quality of life. I then explore the more holistic definitions of quality of life, first examining research on happiness (hedonic welfare) and well-being before turning to preference satisfaction or desire fulfilment, the focus of utilitarianism. I continue by presenting a number of criticisms of utilitarianism leading first to John Rawls' focus on liberty and primary goods and the equal distribution of these as opposed to equality of preference satisfaction (utility) as the key focus of egalitarian justice, and then to Amartya Sen's focus on capabilities to achieve various functionings through freedom of choice. I continue with criticisms of Sen's approach, notably Cohen's on Sen's focus on freedom of choice which he believes is not required, and perhaps not always desired, to achieve all (basic) functionings. Considering the context of rural Malawi, the focus of my study, I continue with consideration of Martha Nussbuam's list of central capabilities which are perhaps appropriate policy goals for achieving a minimum standard of social justice and basic human dignity. Wolff and De-Shalit's idea of clustered disadvantages in basic capabilities being an

ideal priority focus for policy is also briefly discussed here. I then compare and contrast these wide-ranging conceptions of quality of life with the current and often narrow mainstream policy focuses of GDP growth, 'standards of living' in terms of material wealth, and alternative policy options. This section then diverges for a brief discussion of contrasting thought with respect to initial resources and ability, opportunity, effort, choice, rights and reward in society, with respect to human nature and nurture. I also briefly consider the purpose of the state and liberal and non-liberal means of state action to achieve this purpose, and conclude that a form of liberal egalitarianism, including equality of opportunities as well as equalities of certain basic resources, should be the focus of a just society that ensures at least adequate quality of life for all. This conclusion steers me back to thinkers such as Rawls, Sen and Nussbaum. I then briefly expand upon the notion of quality of life, including consideration of the environment, before ending this section with a summary of how theoretical and other considerations have directed my research. The chapter then continues with consideration of the measurement of quality of life.

2.1.1 Definitions of quality of life

Quality of life is a term that can encapsulate how satisfied individuals are with various aspects of their lives or how well their various needs have been met, but there are many specifics and additional notions that have been considered. Here I briefly review definitions of quality of life from the vast literature, beginning, since I am coming from a perspective of health economics, with those from the medical literature.

In 1995, Dedhiya and Kong provided an overview of definitions of quality of life, focusing on physical, mental and social health, but not other aspects of human existence such as aesthetic cultural, economic, environmental and political, concerns, which are often also covered in the philosophical and economic literature (§2.1.7-§2.1.8). These definitions are often not fully rooted in theory but nevertheless can be quite comprehensive. Their review identifies 17 definitions of quality of life, including 9 separate definitions focusing on happiness and satisfaction (i.e. utilitarianism, see §2.1.3, although they don't speak of this), 4 separate definitions focusing on achievement of goals and desires, and 4 separate definitions focusing on social utility and natural capacity (Dedhiya and Kong, 1995). Examples of the definitions focusing on happiness and satisfaction include those by Hornquist (1982): *"The degree of need satisfaction within the areas of the physical, psychological, social, activity, material and structural needs. Individual experience of needs including aspired satisfaction should be considered*"; Dalkey and Rourke (1973): *"A person's sense of well-being, his satisfaction or dissatisfaction with life, or his happiness or unhappiness"*; and, Baltrusch and Waltz (1987): "*The balance between euphoric and dysphoric feeling states*". Examples of the definitions focusing on achievements of goals and desires include those by Gerson (1976): *"The degree to which an individual succeeds in accomplishing his desires despite the constraints upon him by a hostile or indifferent nature, God or social order*"; and Engquist (1979): "*The extent to which an individual is able to achieve security, self-esteem and the opportunity to use intellectual and physical capabilities in pursuit of personal goals*". Examples of the definitions focusing on social utility and natural capacity include those by Avron (1984): "*Based on human capital approach where the value of a life is*

determined by estimating projected lifetime earnings"; and Shaw (1988): *"Quality of life can be measured as QL = NE x (H + S) where quality of life (QL) equals natural endowment (NE) multiplied by the combination of home (H) and society (S)*". Clearly there are a wide range of definitions of quality of life coming from the health literature, some perhaps more adequate and more complete than others. Some are also in clear contrast to others, such as the one by Avron based on lifetime earnings, and broader definitions like those of Hornquist or Engquist, which take account of many other factors. Although these definitions are often deliberately rooted in the health field, many could have perhaps benefited from consideration of political and moral philosophical theory (§2.1.7-§2.1.8).

The World Health Organisation (WHO) defines health as "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*" (WHO, 1946). Although this definition is wide-ranging in that it includes mental and social well-being, it is still narrower than the concept of quality of life in that the latter may also include factors relating to other aspects of life such as a person's income, their freedom, or the quality of their environment (Guyatt et al., 1993). Even though these factors could be indirectly related to a persons health, they are usually beyond the concern of the medical profession and health sector; as such there should be a distinction between overall quality of life and health-related quality of life (Guyatt et al., 1993). This distinction is discussed further in the following section on measurement of quality of life (§2.2).

In a multidisciplinary analysis of the concept of quality of life Haas (1999) defines, from a convenience sample of the large literature on quality of life, that the concept of quality of life (QOL) has the following 5 attributes: *"(a) QOL is an evaluation of an individual's current life circumstances, (b) QOL is multidimensional in nature, (c) QOL is value based and dynamic, (d) QOL comprises subjective and/or objective indicators, and (e) QOL is most reliably measured by subjective indicators by persons capable of self- evaluation."* Haas (1999) decided on these 5 attributes of the concept of quality of life in place of a varying and undefined concept from the previous literature she reviewed and defines quality of life as *"QOL is a multidimensional evaluation of an individual's current life circumstances in the context of the culture in which they live and the values they hold. QOL is primarily a subjective sense of well-being encompassing physical, psychological, social, and spiritual dimensions. In some circumstances, objective indicators may supplement or, in the case of individuals unable to subjectively perceive, serve as a proxy assessment of QOL."* Haas's definition introduces the subjective and objective nature of quality of life, although self-evaluation of subjective indicators is emphasised.

Recently, Costanza and colleagues provided a broad definition of quality of life (QOL) that encapsulates all of the complexities detailed in previous theory and research from a number of disciplines. This definition, which is worth quoting in full is as follows: *"QOL is the extent to which objective human needs are fulfilled in relation to personal or group perceptions of subjective well-being (SWB). Human needs are basic needs for subsistence, reproduction, security, affection, etc. SWB is assessed by individuals' or groups' responses to questions about happiness, life satisfaction, utility, or welfare. The relation between specific human needs and perceived satisfaction with each of them can be affected by mental capacity, cultural context,*

information, education, temperament, and the like, often in quite complex ways. Moreover, the relation between the fulfilment of human needs and overall subjective well-being is affected by the (time-varying) weights individuals, groups, and cultures give to fulfilling each of the human needs relative to the others" (Costanza et al., 2007, p.269). This definition covers both preference-based utilitarianism (§2.1.3) and the capabilities approach (§2.1.5) and is perhaps a useful overall framework to draw on when considering the measurement of quality of life. The WHO definition of quality of life, however, used to originally conceptualise their WHOQoL questionnaire (used in this study, as outlined and justified in §2.2-§2.3.2) is slightly narrower, in that it refers to a subjective evaluation of quality of life in relation to the person's context: "*individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns*" (Saxena and Orley, 1997; WHO, 1998).

The variety of definitions of quality of life may be disconcerting for those seeking to measure it with the purpose of then acting to increase it. Although I have chosen the WHOQoL-BREF as a practical, useful and available tool, and it is fairly comprehensive (§2.2-§2.3), it is perhaps inadequate in a number of ways (§2.3.2). The variety of definitions and perspectives on quality of life can be seen to reflect the ideal of an overlapping consensus of political liberalism (Rawls, 1986; Nussbaum, 2011). By allowing a plurality of conceptions of what is good (what is quality of life), the process of research and action on quality of life can mirror it's aim from the perspective of the capabilities approach (§2.1.5). Nevertheless, it must be recognised that many definitions of quality of life, especially the earlier ones quoted above, were not arrived at by consultation with the people whose quality of life was the subject of measurement. To better represent those the research is seeking to benefit, quality of life can be defined in an iterative process involving as wide a variety of people as possible, and especially those whose quality of life is the subject under study. This was done in the development of the WHOQoL-BREF, described in §2.3. I return to the argument of political liberalism, overlapping consensus and pluralism when discussing limitations of measurement systems for economic evaluation (i.e. no one system will be perfect, §8.6). Now, however, I turn to discussion of different approaches to understanding quality of life.

2.1.2 Happiness and well-being

Over the last two decades a new branch of psychology, hedonic psychology, or the study of well-being, has emerged. Hedonic psychology (Hedonics), according to an early textbook (Kahneman et al., 1999) is actually concerned with a lot more than pleasure (happiness) and pain (unhappiness), also encompassing feelings: "*of interest and boredom, of joy and sorrow, and of satisfaction and dissatisfaction*" and from a wide range of perspectives: "*from the genetic to the societal, and from the biochemical to the cultural*" (§2.2.1). According to this conception, the pursuit of happiness (hedonic welfare) is compatible with theoretical considerations of primary goods (§2.1.4) and the capabilities approach (§2.1.5), as well as those of utilitarianism: preference satisfaction (desire fulfilment), the subject of the following sub-section (§2.1.3).

Related to Hedonics is positive psychology and the study of what constitutes the good

life for individuals. Recently, Seligman (2011) has expounded a view of this, stating five key areas of importance summarised by the acronym PERMA: Positive emotion (pleasure, tasty foods, warm baths, etc.), Engagement (or flow, the absorption of an enjoyed yet challenging activity), Relationships (social ties have turned out to be an extremely reliable indicator of happiness), Meaning (a perceived quest or belonging to something bigger), and Achievement (accomplishments, having realised tangible goals). These, Seligman contends, are appropriate focuses of individual behaviour, but are also useful for governments to consider as goals for public policy (Seligman has recently proposed this to UK Prime Minister David Cameron). The idea is that the attainment of goals in each of these areas results in people being able to 'flourish'.

2.1.3 Utilitarianism

According to Utilitarianism, as originally expounded by Bentham (1789), Mill (1863), and Sidgwick (1907) overall quality of life may be the sum of the utility (pleasure or satisfaction) people get from all of the activities they do in life. Thus a person's utility can be derived from their preferences as revealed in the choices they make. However, preferences are in turn based on a person's characteristics, what they remember of their experiences (see §8.6), and the society within which they live, and people often adjust to situations that are not ideal (Easterlin, 2003). Therefore, satisfying current preferences could support the status quo of an unjust society and does not necessarily allow for true freedom of choice (Nussbaum, 2011). In addition, a person's preferences may be unstable and highly dynamic, as shown by Sen (1993a) in his work on the internal consistency of choice, which is revisited later in the discussion of theoretical and design issues around Discrete Choice Experiments in §5. It is for these reasons, as well as the fact that utilitarianism often aggregates or averages utility across the population, not taking the rights of individuals seriously (Rawls, 1999) and, less solvable, across different unrelated aspects of people's lives (i.e. has a single metric or index), that alternative approaches such as those expounded by Rawls' theory of justice (§2.1.4) and Sen and Nussbaum's capabilities approach (§2.1.5) are perhaps a more useful, and empirically testable, methods of conceptualising and measuring quality of life.

2.1.4 Justice as fairness and equality of primary goods

As an argument against utilitarianism, regarded as dominant in political philosophy, Rawls (1999) conceived *A Theory of Justice* as fairness with respect to individual liberty and rights, and a form of egalitarianism resulting in equality of opportunity including provision of essential 'primary goods' and allowing inequalities to exist only for the purpose of leading to benefits for the least well-off. Rawls' idea was to create "*a theory of justice that generalizes and carries to a higher level of abstraction the traditional conception of the social contract*"(Rawls, 1999, page x) (see §2.1.7 for brief discussion of social contract theory). In re-stating the inviolability of basic rights and liberties Rawls goes against utilitarianism, which allows individual suffering for the good of the many. As Cohen (1993) argues, equality of primary goods also overcomes the 'expensive tastes' criticism of utilitarianism and is a better solution to the 'equality of inoffensive

tastes' extension to utilitarianism. One of Rawls' key ideas is to guarantee for all citizens the social and economic conditions (primary goods) necessary for "*adequate development and the full and informed exercise of their two moral powers -their capacity for a sense of justice and their capacity for a conception of the good*" i.e. the primary goods necessary for his theory of justice to be implemented. These primary goods could be thought of as analogous to Nussbaum's central capabilities (§2.1.5). However, the latter also includes other aspects of justice as fairness, such as those related to liberty (see below).

Rawls' conception of justice as fairness stems from the sense of justice of 'moral' and 'rational' people under a "*veil of ignorance*" of their natural abilities, societal position, wealth, authority, intelligence, strength, and other advantages. Rawls qualifies 'moral' people as those who are reasonable in the sense that they are happy to achieve their own ends -their conception of the good-, cooperatively. Rawls qualifies 'rational' in the narrow sense of taking the most effective means to given ends. This 'original position' of people as equals who have a "*conception of their good and are capable of a sense of justice*" (Rawls, 1999, page 17), is justified by Rawls as the appropriate starting point for a theory of justice, because it will result in an impartial and rational conception of justice that is unbiased by original relative advantage, and it matches the theory's initial concept of justice as fairness. The main principles of Rawls' justice as fairness are, in priority lexicographical order, liberty - everyone has equal rights to basic liberties such as freedom of conscience, association, religion, speech and the conditions (primary goods) required to be free to pursue their conception of the good; and, equality, both realised equality of opportunity to hold unequal (higher) social and economic positions, and the difference principle - all people in higher social and economic positions should work towards the benefit of those most disadvantaged (Rawls, 1999). Rawls believes these principles would be chosen by people in the original position (veil of ignorance) after considered thought leading to reflective equilibrium. Rawls' theory of justice goes against utilitarianism in that it states that no one person (under the original position of equality) would want to suffer in order for a greater benefit to a number of others in society.

Rawls intended 'justice as fairness' as the foundation of social justice in that it does not prescribe a particular form of government; although it does steer towards either a property-owning democracy (in the social-democratic tradition) or a liberal socialist regime. Although such theoretical considerations seem to be going off on a tangent for the subject at hand of describing quality of life, and why it's important, they are in fact central to a consideration of how to evaluate quality of life (§2.2, §8.4, §8.6) and consideration of such measurement more broadly e.g. with respect to weighting and aggregation (§6), for purposes of intervention planning and public policy (§8, §8.5).

2.1.5 The capabilities approach

Aristotle (2009) is the first known philosopher to write about the importance of capabilities to do activities as being more important than money and happiness, and (like Nussbaum with respect to her 'central capabilities', see below) stated that there should ideally be a single

objective list.[1] Nussbaum and Sen (1993) have defined quality of life (well-being) in terms of the capabilities, opportunities and freedoms people have to do things and be things rather than the utility they get from doing the things they actually do. This alternative definition, expounded as 'the capabilities approach' (Sen, 1979; Nussbaum, 2011). is useful as it avoids the problem of utilitarianism, noted above, of people's expectations and preferences adapting to their current circumstances. Such adaptation of preferences is greatly influenced by culture, tradition and social norms, as, for example, in the case of the quality of life and wellbeing of women, who in many societies and cultures may be satisfied with their lives despite a lack of opportunities, as the unequal treatment they receive as a result of traditional biases against them is all they know (Nussbaum, 2000).

It is possible to conceptualise quality of life as a continuum of goods, capabilities/functionings and utility. Goods enable capabilities which, when realised as functionings, result in utility. Cohen (1993) made a distinction between what goods enable someone to do and what receiving the goods does to people, a distinct category he calls 'midfare', which he says does not require the exercise of free-will as he believes Sen says was necessary. For example, food nourishes people and clothes provide warmth regardless of whether the person chose to eat or wear clothes (he uses the examples of babies being fed and clothed here). However, Sen (1993b) contends that midfare is the same as functioning i.e. the realisation of a capability, or a freedom, that does not necessarily have to come about as the result of the person doing something e.g. someone has freedom to live a life free of malaria even though they did not personally kill all the malarial mosquitos themselves. For Sen (1993b), a key idea of the capabilities approach is the importance of freedom of choice of potential functionings, i.e. as well as having a range of beneficial options, a person should be free to choose which ones they pursue toward their conception of the good. Cohen (1993) criticises Sen's focus on freedom in that he says it's not necessary for egalitarian justice of 'access to advantage' (midfare); he argues that a consequentialist approach of ensuring everyone has all they need (minimally) by any means (regardless of freedom or agency) is more important. However, Sen (1993b) thinks freedom is still crucial even at this level as it is of fundamental importance to human dignity.

Sen (1993b) has proposed using the capabilities approach to evaluate the following four kinds of functioning:

1. wellbeing achievement - akin to Cohen's 'access to advantage'
2. agency achievement - also includes non-wellbeing achievements for self and others
3. wellbeing freedom - ability to achieve wellbeing through freedom of choice
4. agency freedom - ability to achieve objectives and goals, including non-wellbeing goals through freedom of choice.

Given that Sen (1993b) sees freedom to choose (rather than having things forced on you or provided without your say) as of intrinsic importance, he favours 3 and 4; and given the importance he attaches to the achievement of non-well-being goals, e.g. fasting, he sees 4, agency

[1] although he did not extend human equality to women or slaves!

freedom, as most important. Nussbaum (2011, Appendix B) has pointed out, however, that given Sen's conception of well-being as more than just the utilitarian notion of preference satisfaction and desire fulfilment, there should be no distinction between well-being and agency in the capabilities approach i.e. concerns of agency are covered within well-being.

Although Sen (1979) first articulated the need for the provision of basic capabilities especially with regard to eduction and health, he has moved more towards an un-prespecified conception of capabilities as freedom and agency to pursue personal conceptions of what is good (Sen, 1999). In this sense Sen's conception of the capabilities approach is more comprehensive than Nussbaum's political conception of the provision of 'central capabilities' as necessary for pursuit of the good (Nussbaum, 2011). Nussbaum (2011) believes that such central capabilities, which she has defined as life, bodily health, bodily integrity, senses, imagination and thought, emotions, practical reason, affiliation, other species, play and control over one's environment (see Table 2.1), should be provided as a bare minimum of a just society that guarantees human dignity. Nussbaum sees additional capabilities not on the central list, as being more important after basic capabilities have been established i.e. that that choice of policy focus on specific capabilities is perhaps more important in richer countries, which perhaps should give more consideration to satisfaction of preferences (utilities) in any evaluative space of quality of life. In poorer countries, such as Malawi, establishing basic central capabilities should be the priority of social and economic policy (which should ideally be egalitarian, see §2.1.7), although providing such basic capabilities should be done in a politically liberal manner (Rawls, 1986) rather than an authoritarian one, i.e. a manner that takes into account the views of local people (Nussbaum, 2011). Wolff and De-Shalit (2007), in their recent work focusing on "*a general pluralistic theory of disadvantage*" argue that such a focus on basic central capabilities should be the initial priority of all social and economic policy, given limited resources and budgets. Wolff and De-Shalit (2007) also extend the capabilities approach by stating that ongoing sustenance and security of capabilities (even against threat or risk of their removal) is also crucial. Via their technique of 'public reflective equilibrium', where basic capabilities are discussed with members of the public[2], Wolff and De-Shalit's approach also endeavours to ensure a real, rather than theoretical commitment to political liberalism (pluralism). Wolff and De-Shalit's work resulted in the addition of 4 central capabilities to Nussbaum's list of 10: doing good to others; living in a law-abiding fashion; understanding the law; and, being verbally independent, especially in terms of knowing the local language. In addition, Wolff and De-Shalit (2007) believe in the importance of *genuine opportunities for secure functioning*, with 'genuine opportunities' being those that don't require a choice between basic capabilities, and don't disadvantage others. They use the example of a single mother's opportunity of a low-paid job far away, that means she would not be able to take her children to school or look after them in the holidays, as an opportunity that is not genuine. They also argue that only in cases of genuine opportunity can a person who doesn't choose, or put the effort into achieving that functioning, possibly be held responsible (Wolff and De-Shalit, 2007).

The capabilities approach has been drawn upon in measures of well-being and overall quality

[2]Providers of public services to the disadvantaged and the disadvantaged themselves were consulted in semi-structured interviews as experts on capabilities and disadvantage.Wolff and De-Shalit (2007, Appendix 1)

of life such as the United Nations Human Development Index (§2.2.3, measurement of capabilities is discussed further in §2.2.4). Capabilities can also be measured in conjunction with other aspects of quality of life more usually measured in terms of current utility. For example, a person's capability to do physical things is very much dependent on their ability to move around and on their general level of health, and a person's ability to accomplish tasks they desire through thinking and learning is dependent on their capability (and freedom) to concentrate and to sleep. Examples of the latter measures -wellbeing as current utility- are how much someone currently enjoys life, or how depressed someone currently is. As detailed in §2.3, the WHO quality of life questionnaire, chosen as a focus of study in this thesis, incorporates questions asking about both capabilities and utilities in order to gain an overall understanding of a person's quality of life from a broad perspective.

2.1.6 GDP growth and more promising alternative policies

It could be argued that, for some time, per capita Gross Domestic Product (GDP) has been the metric of choice for measuring human progress. Such a narrow aggregate measure is clearly inadequate for a number of reasons, not least the fact that it ignores issues of distribution (you can have a very unequal society that nevertheless has a high and growing GDP), ignores many areas of human life considered important, including health, education, domestic work, raising children, happiness not derived from consumption etc., and arguably contributes to the blind pursuit of economic growth with complete disregard for social justice and the future of humanity (Douthwaite, 1992). However, quality of life is sometimes still confused with income and material wealth (standard of living), which has been shown to not always be related to emotional well-being and happiness (Easterlin, 2003; Kahneman and Deaton, 2010). This is starkly illustrated at national level by recent separate media reports indicating that whilst the UK may have the "second highest standards of living" in Europe (Collinson, 2011) it also has the "worst quality of life" in Europe (King, 2011).

Material wealth often doesn't lead to increased happiness or well-being because individuals' aspirations often rise along with their incomes (i.e. people adapt to their material circumstances), and material wealth is also based on social comparison (and consequently on equality), both of which are often overlooked by individuals (Easterlin, 2003). In contrast, Easterlin (2003) concludes, individuals are less likely to adapt to health, marital status and other non-financial sources of happiness intrinsic to their well-being and therefore should focus on these more. Other studies (e.g. Clark et al., 2008) disagree with Easterlin's in that they provide evidence for people having a 'set-point' of happiness that they return to even after positive events like marriage, or the birth of a child, or negative events like divorce.[3] Kahneman and Deaton (2010) differentiate subjective well-being into current life satisfaction (or life evaluation, akin to that studied by Easterlin (2003) to assert the preceding conclusion) and emotional well-being (or experienced happiness). They find that although increases in income generally result in people scoring themselves higher on a scale of 0-10 of how satisfied they are with their lives[4], increases

[3] usually after 2 years; only the effect of unemployment was found to be associated with continued lower well-being 5 years later

[4] Cantril's Self-Anchoring Scale, a ladder with rung 0 at the bottom denoting "worst possible life for you" and

in income beyond around $75,000 a year do not improve daily emotional well-being. Hedonics, the study of happiness, is discussed further in §2.1.2.

The UK government recently requested the Office for National Statistics (ONS) to measure well-being. The ONS added 4 questions to the 200,000 people per quarter year Integrated Household Survey. These questions cover both the life evaluation (overall satisfaction) and emotional wellbeing concepts in the research by Kahneman and Deaton (2010) outlined above. The 4 questions are: *"How satisfied are you with your life nowadays? How happy did you feel yesterday? How anxious did you feel yesterday? To what extent do you feel the things you do in your life are worthwhile?"* (Dolan et al., 2011; Office for National Statistics [UK], 2011). Questions regarding what the UK government will do with the data generated remain, but such efforts should be seen as a useful addition to (or perhaps even better, a replacement for) the focus on economic growth as measured by Gross Domestic Product (GDP) as the only measure of success of a country. Nevertheless criticisms remain, the main one being that from the New Economics Foundation (2011b), who argue that in such high-consuming societies as the UK, account must be taken of how many resources are used up to produce well-being i.e. we need *"good lives that do not cost the Earth"*. The New Economics Foundation (2011a) propose the Happy Planet Index (HPI) as an alternative measure of well-being that also accounts for resource use.

In low-income countries, such as Malawi, there has yet to be any move toward governments using measures of quality of life and well-being, such as those being considered by the UK government detailed above. This is perhaps due to a greater focus on basic physical needs that low-income country governments believe are better encapsulated by ensuring a certain level of GDP per capita. However, studies have shown that even among the poor, or within a certain wealth group or quintile, quality of life can vary significantly (Alkire and Foster, 2011; Wilkinson and Pickett, 2009). Measures such as: the Gini coefficient, which measures inequality of incomes; the Human Development Index, which measures life expectancy and education as well as income; and the Multidimensional Poverty Index that also includes measures of living standards as well as of health and education (Alkire and Foster, 2011); are being increasingly used internationally, however. Although such measures are usually more a focus of international organisations, such as the UNDP (2011), than governments. Adding more sensitive, detailed and holistic measures of quality of life, such as those intended to measure all of the main capabilities considered important, would add value by shifting the focus of policy further toward areas considered vital for human life.

Alternative policy focuses to GDP growth that explicitly consider quality of life, such as those discussed in this section and chapter, are clearly important. Whether they will replace a focus on GDP as a main policy goal, or instead add additional perspectives to GDP for policymakers to consider, obviously remains an open question. In the following section I make a case for the former.

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rung 10 at the top denoting "best possible life for you"

2.1.7 Appropriate goals for society[5]

People are born into vastly different situations with respect to resources available to them (their environment), and their natural abilities (genetic inheritance, but also epigenetics during pregnancy). Various manifestations of these environmental and innate factors (nature and nurture) subsequently also affect people throughout their infancy, childhood, adolescence and adulthood, resulting in them having widely different opportunities to succeed in achieving their goals in each of these life stages. In many cases, especially in the developing world, basic goals of subsistence are not met, or are only barely met. As well as people being presented with different opportunities, actual achievement is also dependent on the effort people make to strive to succeed, and the choices people make in how they live their lives. Left-wing and right-wing political philosophies differ with respect to interpretations of how these factors influencing human life relate to people's rights and appropriate rewards. Right-wing thought often focuses on individual effort, responsibility and choice and sees inequality as necessary and based on just rewards for the effort and choices individuals make, often ignoring inequalities in initial opportunities and natural abilities (which are sometimes also seen as justification for maintaining inequality especially in more conservative doctrines and those reflecting traditional practices). Left wing thought, on the other hand, is more concerned with people's rights to resources, the attainment of certain standards of living and wellbeing, and the minimisation of inequalities of opportunities and also of resources (egalitarianism). Given my focus on rural Malawi, which is very deprived of resources and opportunities, sometimes even for basic subsistence, I focus on left-wing conceptions of what is good for society, focusing on egalitarianism (people should be treated equally) which will become more relevant in discussions of policy with respect to economic evaluation of health interventions (§8.4-§8.7). Obviously, such Western philosophical conceptions of justice are imposed by outsiders like me, as is the idea of intervening with women's group interventions or any other interventions, in the first place. Local Malawian conceptions of justice as opposed to expert-led conceptions are obviously also crucial to consider (for more on this see §8.4-§8.7).

Both right-wing and left-wing ideals can be pursued by either liberal or authoritarian means. Assuming its existence, a state government can achieve its purpose by either liberal or non-liberal means of state action. Given the ideal of human freedom, liberal means are preferable. The purpose of the state can be conceived in a number of ways, usually independent of left and right-wing thinking. I focus on social contract theory as it provides an elegant conception of the liberal state. In their articulations of social contract theory Locke (1689) and Rousseau (1762) believed that the state exists to uphold the pre-existing rights and freedoms of people, and that the social contract between the people and the government consists of people really consenting to be governed to ensure the protection of these natural rights, with Rousseau also stating the importance of the state implementing the 'collective good will' of the people. Kant (1797), on the other hand, believed the social contract to be based on the hypothetical consent of the people to be governed and that only human freedom existed before the state and that rights were created (and are to be upheld) by the state. Rawls (1999) extended the social contract

[5]although this section may read a bit like an exposition of personal politics in parts, it is intended as a link between theory and policy, on the grounds that the capabilities approach and related theories are necessarily left wing in their manifestation.

theory of Kant, to argue that the provision of primary goods by the state is also necessary in order to ensure true freedom (liberty) and equality of opportunity - i.e. you can't be truly free if you are not free from want (§2.1.4). Korsgaard (1993) explains this with an illuminating example of a sexually-harassed minimum-wage worker who, although notionally free, has no real option to choose alternative employment if she wants to keep her children from starving. Sen (1979) then extends the ideal of the state to securing rights in terms of capabilities of people to do and to be; and Nussbaum (2011) formulates a basic list of central capabilities to be guaranteed by the state. Wolff and De-Shalit also advocate the provision of such central capabilities, via a united focus on distributive equality of resources and social equality, focusing limited resources on the most disadvantaged and on security of capabilities, also bearing in mind the responsibility of individuals: "*the government should guarantee genuine opportunities for secure functionings*"(Wolff and De-Shalit, 2007, p14) (§2.1.5). Such a focus of government seems reasonable to me and is also considered in discussions of policy with respect to economic evaluation of health interventions (§8.4-§8.7).

Additional important considerations of appropriate goals for society are the 'means to the ends'. Consequentialist theories see outcomes to be of primary importance (this is a key component of utilitarianism, where the goal is to maximise total utility §2.1.3) i.e. the ends justify the means. Deontological theories, on the other hand, permit pursuit of good outcomes only by means of actions that are also ethical, i.e. they are rule-based, with the means justifying the ends. Kantian social contractarianism sees people as ends in themselves as well as a means and thus is deontological in that the importance of individuals is clear i.e. the freedom and rights (e.g. in the case of Rawlsian equality of primary goods) of people must always be considered (as rules) in the pursuit of the goals of society. The current preoccupation of governments with GDP growth, often at the expense of everything else (§2.1.6), can be seen as ignoring the fact that humans are ends in themselves and not just means for further production (Sen, 1989). Means and ends are considered with respect to these alternative approaches when considering the application of measurement of quality of life (§8.4-§8.7).

2.1.8 Other considerations

When considering quality of life and measures necessary to ensure it, it is perhaps also important to consider future generations. The work on 'basic' and 'central' capabilities and 'disadvantage' quoted above only exhibits limited concern to questions of the environment and sustainability with respect to the distribution of the finite resources of the planet. For example, Nussbaum's central capability 'other species': "*Being able to live with concern for and in relation to animals, plants and the world of nature*" does not explicitly state the ideal of sustainable living or a concern for future generations. As pointed out by Douthwaite (1992) and others (e.g. the New Economics Foundation (2011a) Happy Planet Index , see §2.1.6) any policy aimed at human welfare and quality of life should also take account of the finite nature of natural resources and how the use of such resources may affect the quality of life of future generations, for example, through the effects of anthropogenic climate change.

Other additional considerations, that Nussbaum points out are under-developed in her con-

ception of central basic capabilities, but are compatible with the capabilities approach which she states "*promises a new, and relatively unified, perspective on problems that are often treated in isolation from one another*"(Nussbaum, 2011, p143) include disability, ageing, animal entitlements, constitutional law and political structure, and human psychology (Nussbaum, 2011, chapter 8)(Nussbaum, 2006).

2.1.9 Summary and research direction

The theoretical foundations of traditional welfare economics see quality of life in terms of satisfaction of preferences (utilitarianism), whereas the capabilities approach is often deemed extra-welfarist as it is broader in the sense it sees quality of life in terms of capabilities to do or be. As the capabilities approach overcomes many shortcomings of utilitarianism, and Nussbaum's list of central capabilities seems an appropriate initial priority focus, especially in low-income settings such as Malawi, I believe it better represents quality of life. I now turn to *how* quality of life can be measured.

2.2 Measurement of Quality of Life

Operationalising the measurement of theoretical conceptions of quality of life remains a significant challenge. Robust measurement is crucial if we are to have more than a superficial understanding of current trends in, and future prospects of, quality of life of people and populations we are interested in. Populations are of course many and varied and could be, for example, national populations (Office for National Statistics [UK], 2011), specific communities (Chan et al., 2004), or groups of people with a specific condition (§2.2.2), under specific circumstances (Moyer et al., 2009), or allocated to a specific intervention i.e. in the context of evaluation of an intervention. Health researchers, economists, sociologists, anthropologists, governments, the people under study, and the general public, are interested in the measurement of quality of life (and 'wellbeing' and 'happiness', §2.1).[6]

In this section I first discuss different perspectives in the measurement and analysis of quality of life, before giving an overview of the measurement of health-related quality of life. I then move on to discuss measurement of overall quality of life, bearing in mind some of the considerations of the previous section. Given my justifications for focusing on the capabilities approach (§2.1.5) I then briefly discuss issues pertaining to the measurement of capabilities. I then finish with a brief discussion of the importance of the time-frame used in quality of life measurement and temporal effects on quality of life, and of issues related to ensuring cross-cultural equivalence of instruments designed to measure quality of life. The following section provides more detail on the WHOQoL-BREF, the instrument I chose (§2.1.9, §2.2.3) for measurement of quality of life in my study.

[6] In the UK, the All-Party Parliamentary Group on Wellbeing Economics is an example of how many different interested parties are coming together to discuss quality of life; see http://parliamentarywellbeinggroup.org.uk/

2.2.1 Levels in the analysis of quality of life

Quality of life can mean a variety of things depending on which perspective one is coming from, as detailed and discussed in §2.1. One way of conceptualising the variety of perspectives is provided in Figure 2.1, adapted[7] from the preface of *Well-Being: The Foundations of Hedonic Psychology*, edited by Kahneman et al. (1999). As Figure 2.1 shows, the very definition of what the good life is (i.e. what quality of life is) will depend on the cultural and social context. I presented different definitions of quality of life in §2.1.1. Methods of arriving at definitions are also important, different examples being public reflective equilibrium (see §2.1.5) and bottom-up iteration (§2.3). When comparing quality of life between cultures, methods of ensuring cross-cultural equivalence are also crucial (§2.2.6). Figure 2.1 then shows that quality of life can be conceptualised as subjective well-being but also objectively as capabilities (discussed in §2.1.5) and tasks, and is related to people's values (discussed in §2.1.7 and §2.1.4). The measurement of subjective well-being (largely the concern of this section and of the WHOQoL-BREF, §2.3), is very much dependent on people's judgement, the measurement of which is in turn very much dependent on the heuristics people employ and the biases that affect them when completing questionnaires or other measurement techniques (the subject of §5). Figure 2.1 then goes on to show that subjective well-being can be affected by persistent moods, which in turn can be divided into real-time pleasures and pains and transient emotions. Clearly, quality of life is influenced by events of a person's (distant) past including biological and social determinants, as well as those more recent, including transient emotions. The effects of time, including how current judgement of past events may be different to how these events were viewed at the time, are discussed in §2.2.5. Finally, mood is ultimately reduced to neurobiology, however, this is beyond the scope of my study.

2.2.2 Health-related quality of life

It may be useful to measure quality of life as part of evaluations of public sector interventions including those in the health sector. Measurement of quality of life is also a useful addition to measurement of mortality and morbidity in evaluation of the benefits/costs of health interventions (Drummond et al., 2008b) (§1.4). Cost-effectiveness analysis often overlooks overall quality of life benefits due to their amorphous and difficult-to-measure nature; where quality of life is included in cost-effectiveness analyses it is usually of a health-related nature, extending the analysis to cost-utility analysis (Drummond et al., 2005). Many questionnaires, such as the HUI-2 (Torrance et al., 1996), HUI-3 (Furlong et al., 2001), SF36 (Ware and Sherbourne, 1992), SF6-D (Brazier et al., 1998) and EQ-5D (Rabin and Charro, 2001) specifically seek to measure health-related quality of life. These are typically structured in terms of a number of domains such as 'mobility' and 'environment' and then subdivided into different facets (questions) such as: 'How well are you able to dress yourself?' which the respondent is typically asked to answer on a scale of 'not at all' to 'always'. Such instruments often do not consider underlying theories of welfare and justice such as utilitarianism or the capabilities approach (see §2.1).

[7] I have added how these different perspectives relate to my work in blue text

Figure 2.1: Perspectives and levels in the measurement and analysis of quality of life

Removed from open access electronic version of thesis due to permission not being granted by The Russell Sage Foundation, the publishers of the original figure from Kahneman et al. (1999). The figure is contained within the printed version found in the UCL Library.

Supplementing research on overall health-related quality of life, much of the research on quality of life has been focused on specific health conditions, with quality of life measurement often tailored to specific unique attributes of the condition in question. A search of PubMed[8] reveals over 33,000 articles related to medicine with "quality of life" in the title, the majority of which seem related to specific health conditions. In high-income countries, these conditions are usually chronic: such as cancer (Aaronson et al., 1993); chronic lung disease (Guyatt et al., 1987); or chronic kidney disease (Molnar-Varga et al., 2011) - with specific measures such as fatigue, nausea and vomiting for cancer, dyspnoea for chronic lung disease, and the burden of kidney disease for chronic kidney disease sufferers, respectively. In low-income countries, there has been less published research on quality of life[9] but the focus also reflects local disease priorities such as HIV (van Rensburg, 2009). Fan et al. (2011) have also recently measured quality of life in people living with HIV and AIDS in Malawi using the SF-36D.

2.2.3 Overall quality of life

In the 1980s, Hornquist developed a method of holistic evaluation of quality of life in Sweden (Hornquist, 1982, 1990). This method, which appears to be no longer used much in quality of life research, especially outside Sweden, contains physical, psychological, social, activity, material and structural needs domains. Hornquist's dynamic version of his questionnaire that asks how quality of life dimensions have changed over time, enables the evaluation of the effect of health interventions on quality of life. Hornquist sees the use of his questionnaire as more applicable

[8] available here: http://www.ncbi.nlm.nih.gov/pubmed?term=quality%20of%20life%20%5Bti%5D (last accessed 10/05/2012)

[9] as indicated by the aforementioned "quality of life" [ti] PubMed search

to those with somatic health conditions rather than psychological conditions in that those with somatic conditions are more likely to want to and to be able to state their problems. His questionnaire, extensively validated, has been applied to a number of specific health conditions including alcohol abusers, and those somatically disabled; its use clearly limited to the health sector (Hornquist, 1990).

In the last 15 years or so efforts to measure overall quality of life from perspectives outside health have increased. Such efforts include those used to rank the quality of life of countries such as The Economist (2005) Intelligence Unit's quality of life index, which links subjective and objective measures of quality of life including life expectancy, the divorce rate, the latitude of the country, the employment rate, GDP per capita, community life, gender equality and an index of political freedom. The UN Human Development Index (HDI) is another such measure of 'well-being' of countries and as such is also related to quality of life. It is a composite index of life expectancy at birth, infant mortality and the adult literacy rate (UNDP, 1990; Haq, 1995) and has its roots in the capability approach (Sen, 1989) (see §2.1.6 and §2.1.5). Recently, the HDI has also been extended in a number of ways, including those examining inequalities between men and women (Fukuda-Parr, 2003), and between rich and poor (UNDP, 2011). These measures are all primarily aimed at assessing large-scale changes as measured by a few key indicators, and are usually used in the context of comparing and ranking countries. Measures such as the WHOQoL-100 have been constructed and cross-culturally validated to measure quality of life from a broad multi-dimensional perspective, at the level of the individual (The WHOQoL Group, 1998).

The WHOQoL-100 seeks to measure general quality of life by including a comprehensive set of domains and facets relevant to all areas of life, not just health. Such general questionnaires are arguably more suitable for evaluating the effects of the women's groups. The WHOQoL-BREF is the shorter version of the WHOQoL-100 questionnaire; although it only has 26 questions as opposed to 100, it also aims to cover all facets of quality of life, subdivided into four domains: physical; psychological; social, and environment (Skevington et al., 2004). I chose the WHOQoL-BREF for measuring quality of life in my study, despite the fact it does not cover as broad a definition of quality of life as the one by Costanza et al. (2007) (end of §2.1.1) and the fact it does not fully reflect the capabilities approach, because it is already available, cross-culturally validated, and developed by broad consensus in a bottom-up manner (§2.3), covering a broad range of facets of quality of life.

2.2.4 Measurement of capabilities

There are a number of issues that need to be considered in the measurement of capabilities. These include empirical issues of what questions to ask, and analytical issues of how to interpret the data from any questions that were asked. Some capabilities, like self-respect, and appearance in public without shame, are difficult concepts to evaluate objectively. Objective measurement could perhaps be achieved by use of proxy indicators e.g. spending on leisure activities for capability for leisure, and size of apartment for integration with the community - the idea being larger apartments better enable people to have guests over (Gaertner, 1993), although

the availability of public spaces for social gatherings such as parks, cafes, pubs, and churches are also important in this regard. In this sense it is perhaps easier to look at commodities, or primary goods, that enable extensions of capabilities/freedoms rather than trying to evaluate the extensions to freedom themselves (Gaertner, 1993). For example, the availability of a clean and healthy environment and a well-resourced health system will enable the capability of bodily health, and the availability of well-resourced schools, libraries and online learning resources will enable capabilities related to education, sense, imagination and thought. Perhaps the best approach is therefore to look at characteristics of the commodities (including the range of them), as first outlined by Gorman (1956) and Lancaster (1966), the latter of whom contributed to the foundations of Random Utility Theory, which underlies Discrete Choice Experiments (§5.2.1). But not all additional characteristics are valuable - this is where DCE could come in. Sen's 'elementary evaluation' involves the evaluation of the chosen element only, the achieved n-tuple of functionings from the vector of available capabilities (Sen, 1993b), - this would be akin to dominance of one attribute in a DCE (Table 5.1 (ii)). Achieved functionings are usually a matter of subjective opinion, and are therefore perhaps best measured by questionnaires seeking to evaluate quality of life. How to weight different parts of the vector of capabilities is an issue (Gaertner, 1993), with any method designed to elicit such weighting also subject to the decision-making constraints detailed in §5.4.

Other more extensive problems with analytically measuring capability include how to weight pre-existing rights and freedoms, and how to consider inter-dependencies between people i.e. one person's capability leading to a lack of capability in another, which Nussbaum (2011) terms as a "*choice between evils*". Then there is the question of variation of what constitutes a desirable capability set over time and in different cultures and social and economic contexts. In this regard however, there is the ideal of political liberalism as espoused by Rawls (1986) and supported by Nussbaum (2011) in her recognition of the fact that her basic central capabilities should not be set in stone, but instead should be able to be adapted to societal preferences and circumstances. In addition there is also the problem of evaluating positive and negative feedback loops akin to Wolff and De-Shalit's notions of fertile functionings and corrosive disadvantages (Wolff and De-Shalit, 2007) (§2.3.2), and also flagged in Hornquist's work on assessing his conception of quality of life (Hornquist, 1990). Further debate around operationalising the capabilities approach has centred around separation of health capabilities from other capabilities, or not, and on alternative methods of bridging the gap between theory and meaningful measurement (Lorgelly et al., 2010; Ruger, 2010). These issues with measuring capabilities are discussed with reference to economic evaluation and consequent policy in §8.

Notwithstanding the many issues surrounding the measurement of capabilities, instruments such as the ICECAP-O for measuring capabilities important to old people (Grewel et al., 2006; Coast et al., 2008a), ICECAP-A for measuring capabilities in adults (Al-Janabi et al., 2012), and the OxCAP measures (Anand et al., 2009), have recently been developed and used in the UK. Although the latter two measures are potentially applicable in this study, the WHOQoL-BREF was chosen instead for the reasons stated in §2.3 below.

2.2.5 Time-frame and temporal effect

The mood a person is in when they complete a quality of life questionnaire will of course affect their assessment of their quality of life. For example, it is possible that the simplifying heuristics people often use to answer overall life satisfaction questions in a few seconds may lead them to answer with reference to the life events more immediately available to them in their minds i.e. those that are nearer in time to the survey (Kahneman, 2011n, p.400); therefore meaning that the observations of studies of life satisfaction, such as that by Easterlin presented in §2.1.6, reflect how people answer these questions rather than how satisfied they really are with their lives (as they would indicate after a detailed self-examination). It is for this reason that questionnaires are often framed in such a manner as to ask about a person's quality of life over a certain period of time, for example, two weeks in the case of the WHOQoL-BREF (Appendix E). Nevertheless, it is important to bear in mind that transient emotions could still affect the way a person completes the questionnaire. In addition, reflection on, and memory of, previous life events that still shape current quality of life can vary with the temporal distance of the event to the time of survey completion (Schwarz and Strack, 1999). However, in this case it can be argued that even if this were true, a person's quality of life in the time-period in question is still accurately being measured, as it is not possible for them to have a different level of quality of life independent of these temporal effects. The distinction and differences between how people experience events in the present (experienced utility) and how they remember them, even immediately afterwards, (remembered utility) nevertheless remains an important consideration, and is discussed along with its implications in §8.6.

Changes in quality of life can be captured by repeat measures using the same questionnaire, or by questionnaires specifically referencing time periods related to treatments or interventions under study, such as the one developed by Hornquist (1990) (§2.2.3). Unfortunately, time and resource constraints precluded me from measuring quality of life at different time points (§4).

2.2.6 Cross-cultural equivalence

When considering comparison of measurement of quality of life between cultures it is important to ensure that the same thing is being measured. As outlined by Herdman et al. (1997) it is important to ensure cross-cultural equivalence of the measurement tool in a number of respects, including concept, items, semantics, and operation. What follows is a discussion of each of these, as outlined in Herdman *et al*'s review, with regard to the development of the Chichewa version of the WHOQoL-BREF, the first empirical contribution of my thesis and the subject of the following chapter. Conceptual equivalence refers to whether the concept(s) of quality of life being measured are the same between cultures and can be investigated by consulting experts and by qualitative research with the people whose quality of life is to be measured (for example as was done in the translation and adaptation of the WHOQoL-BREF for use in Malawi, §3). Item equivalence depends on the relevance of the items included for measuring quality of life to the culture in which quality of life is being measured, which can also be determined by consultation of the target culture and expert opinion as well as review of data on lifestyle patterns and habits. Whether or not particular items measure particular traits.

which are often characterised as domains, can be measured by Cronbach's alpha. Cronbach's alpha is a measure internal consistency, and was calculated for each domain of the Chichewa WHOQoL-BREF developed as part of my study, as detailed in §3.2.6. Semantic equivalence means that the translation of the tool to the new language has resulted in both versions having the same meaning. Translators need to be aware of the target audience, who should also be consulted. The WHO-mandated translation process, followed in my study, sought to ensure semantic equivalence by a number of procedures (§3.1.1). Operational equivalence requires methods of survey administration that result in participants having the same understanding of the tool across cultures. As well as ensuring equivalent instructions and format of the tool, this may also require additional considerations such as the instructions and questions being read out to illiterate people (§3.1.2). Overall, the different types of equivalence sum to 'functional equivalence'. Conceptual equivalence is the most important, i.e. we should know that the instrument is measuring the same concepts of quality of life in each target culture. Failure to achieve other types of equivalence means that the results can't be compared across cultures (Herdman et al., 1997).

2.2.7 Resources spent deciding how to allocate resources

How we decide how to decide what should be considered an attribute of quality of life, or indeed more broadly what should be considered an important policy goal worth spending limited resources on, is also important, as it clearly has implications for what is valued, measured and consequently acted upon (Ord, 2005). Given that you may then need to decide how we deicide how to decide, such considerations can become infinitely recursive! Rather than aiming for the impossible goal of complete optimisation of decision-making, it is perhaps better, therefore, to choose methods of 'satisficing' i.e. methods of deciding how to decide that are 'good enough'. I discuss the impossibility of optimisation with reference to alternative schools of thought related to 'bounded' rationality in §5.4, and discuss methods of deciding how to decide, with reference to Decision Resource Effectiveness Analysis (DREA) - weighing up the benefits and costs of the decision-making process itself - in §8.2 and §8.6.

2.3 The WHOQoL-BREF

The WHOQoL-100, and the condensed WHOQoL-BREF, containing the 26 most important questions from the original 100 (see Appendix E), are the only cross-culturally-validated questionnaires for measuring all aspects of quality of life. Translated and compared between diverse cultures the questions convey the same meaning, as far as possible, for different groups of people throughout the world. Due to this, and the fact that the women's groups are likely to affect quality of life beyond a restricted health-related set of determinants; also that the evaluation of often-illiterate women in village communities requires a shorter and simpler tool, the WHOQoL-BREF was chosen to evaluate women's quality of life in relation to the MaiKhanda women's group intervention.

Because the WHOQoL-BREF had not been used in Malawi before, it was first translated and

validated through pre-testing and piloting with guidance from the WHO[10] (§3). The resulting Malawian version was then used to investigate whether the women's groups improved the quality of life of their members (§4). What follows is a discussion of how the questions (facets) and domains of quality of life measured by the WHOQoL-BREF were arrived at, and how they relate to theoretical considerations such as those discussed in §2.1.2-§2.1.5). I then turn to applications of the WHOQoL-BREF in light of theoretical and other considerations.

2.3.1 WHOQoL: development and relation to theory

The WHOQoL was developed by an extensive consultative process, whereby members of the public of 15 diverse countries were asked to list and discuss the things most important to their lives in a series of iterative focus group discussions in each country. A total of around 1800 different questions and 1000 distinct areas of life were identified and these were reduced, in an extensive process involving rank-ordering the different questions by "*how much it tells you about a respondent's quality of life in your culture*", to 236 that were piloted (The WHOQoL Group, 1995; WHO, 1998). Finally, following piloting on 4802 people in the 15 countries, 100 questions were chosen for the final questionnaire (The WHOQoL Group, 1998). This process of development of the WHOQoL was bottom-up and not constrained by any previously-defined theoretical framework, apart from the initial conception of quality of life by the WHO as being a person's subjective perception of their position in life (see §2.1). Nevertheless, it seems to fit well with less representative theoretical approaches to the measurement of well-being and quality of life such as the capabilities approach, introduced earlier (§2.1.5). The version of the capabilities approach succinctly outlined by Martha Nussbaum in her recent book (Nussbaum, 2011), defines 10 central capabilities. The attainment of socially/culturally/politically-defined thresholds of each, Nussbaum argues, is: a minimum requirement for individuals to live lives of human dignity; and, a pre-requisite for the society they are a part of to be minimally socially just (considerations of equality and security of capabilities would then also be needed).

The 10 broadly-defined central capabilities (Nussbaum, 2011) are outlined in Table 2.1, along with how they could be said to be related to each of the questions of the WHOQoL-BREF. All the questions on the WHOQoL-BREF ask about the person's life in the last 2 weeks and often ask about current functioning (often in terms of satisfaction, see Appendix E). However, some ask specifically about capability to function, such as those on pain (q3), medicine (q4), concentration (q7), bodily appearance (q11), leisure activities (q14), mobility (q15), daily living activities (q17) and work capacity (q18). The WHOQoL-BREF does not specifically ask about whether the person's functionings result from realisations of capabilities through exercised freedom of choice, seen of key importance by Sen (§2.1.5). Also there are some capabilities, such as those related to freedom of speech, religion, political participation, choice in reproductive matters, and capability to own land and property, whose functionings are not represented in the WHOQoL-BREF, and some whose functionings are, but more tenuously. The latter are those where the WHOQoL-BREF does not specifically ask about the social and political context surrounding the capability/functioning and is perhaps more concerned with the functioning

[10] Permission was granted by the WHO for use of the WHOQoL in Malawi on 6/2/2009.

with respect to personal health e.g. being able to move freely from place to place (under central capability 3, 'bodily integrity') and the WHOQoL-BREF facet concerned with mobility (q15, how well are you able to get around?); and the central capability not being secure against violent assault, including sexual and domestic violence (also under 3, 'bodily integrity') and the WHOQoL-BREF facet concerned with pain (q3, to what extent do you feel that (physical) pain prevents you from doing what you need to do?; Table 2.1). Similarly, there are some facets of the WHOQoL-BREF: satisfaction with bodily appearance (q11), having enough money to meet needs (q12), sleep (q16), and satisfaction with ability to do daily living activities (q17), that are not specifically covered in Nussbaum's list of central capabilities. Nevertheless, there seems to be a reasonable fit between the WHOQoL-BREF and Nussbaum's list of central capabilities, both of which aim to encapsulate quality of life from the broadest perspective by aiming to cover at least all the most important areas of people's lives.

Table 2.1: The WHOQoL-BREF, capabilities and utility

Central Capabilities - text from pages 33-34 of Nussbaum (2011)		**WHOQoL-BREF facet**[a]	**Notes**
1. Life	Being able to live to the end of a human life of normal length	2. Health	
	Not dying prematurely	24. Health serv. access	WHOQoL-BREF facet access to health services, perhaps covers all locally appropriate services (including traditional?)
	or before one's life is so reduced it's not worth living		
2. Bodily Health	Being able to have good health	2. Health	
		10. Energy	
	including reproductive health	24. Health serv. access	
	to be adequately nourished	27. Food enough	
	to have adequate shelter	23. Living conditions	
		9. Envir. healthy	
3. Bodily integrity	Being able to move freely from place to place	15. Mobility	This capability is also about restrictions on movement by family/society etc., which the WHOQoL-BREF is perhaps less concerned with
		25. Transport	
	to be secure against violent assault	8. Security	
	including sexual assault	3. Pain	WHOQoL-BREF facet not really the same as pain could be from health problems rather than assault
	and domestic violence		
	having opportunities for sexual satisfaction	21. Sex life	
	and for choice in matters of reproduction		
4. Senses, imagination and thought	Being able to use the senses		
	to imagine	7. Concentration	
	think		
	reason		
	and do these things in a "truly human" way		
	a way informed and cultivated by adequate education	13. Information	
	including, but by no means limited to, literacy		
	basic mathematical and scientific training		
	Being able to use imagination and thought in connection with	6. Life meaning	
	experiencing and producing works of one's own choice,		
	religious		
	literary		
	musical, and so forth		
	Being able to use one's mind in ways protected by		
	guarantees of freedom of expression		
	with respect to both political		
	and artistic speech		
	and freedom of religious exercise		
	Being able to have pleasureable experiences and to avoid	5. Enjoyment	
	nonbeneficial pain		
		3. Pain	
		4. Medicine	
5. Emotions	Being able to have attachments to things and people outside ourselves		
	to love those who love and care for us	20. Relationships	
	to grieve at their absence		
	in general, to love,		
	grieve		
	to experience longing		
	gratitude		
	and justified anger		
	Not having one's emotional development blighted by fear and anxiety	22. Support	

Table 2.1 continues on the next page

Table 2.1 continued:

Central Capabilities - text from pages 33-34 of Nussbaum (2011)		WHOQoL-BREF facet[a]	Notes
6. Practical reason	Being able to form a conception of the good and to engage in critical reflection about the planning of one's life		
7. Affiliation	(A) Being able to live with and toward others, to recognise and show concern for other human beings to engage in various forms of social interaction to be able to imagine the situation of another	20. Relationships	
	(B) Having the social bases of self-respect and nonhumiliation	19. Self satisfaction	WHOQoL-BREF facet is perhaps more in the personal context rather than the social context.
	being able to be treated as a dignified being whose worth is equal to that of others. This entails provisions of nondiscrimination on the basis of race, sex, caste, religion, national origin.		
8. Other species	Being able to live with concern for and in relation to animals, plants and the world of nature.		
9. Play	Being able to laugh, to play	5. Enjoyment 26. Depression	Depression is not specifically mentioned on the capabilities list, however, it restricts the ability to laugh and play
	to enjoy recreational activities	14. Leisure	
10. Control over one's environment	(A) Political. Being able to participate effectively in political choices that govern one's life having the right to political participation protections of free speech and association		
	(B) Material. Being able to hold property (both land and moveable goods), and having property rights on an equal basis with others		
	having the right to seek employment on an equal basis with others	18. Work capacity	WHOQoL-BREF facet is not about rights but ability
	having the freedom from unwarranted search and seizure In work, being able to work as a human being, exercising practical reason and entering into meaningful relationships of mutual recognition with other workers		
Not on capabilities list		11. Appearance	
		12. Money	Being able to work as s human being, exercising practical reason, does not cover appropriate financial reward and there is nothing else about having enough money or resources on the list.
		16. Sleep	Not covered as part of the bodily health capability
		17. Daily activities	

[a] see Appendix D for full text of each of the WHOQoL-BREF facets (questions)

2.3.2 Applications of the WHOQoL-BREF

The information gained from the WHOQoL-BREF questions can be used to model utility, and individual and societal preferences for the areas of quality of life (capability and functionings) covered (see §5 and §6). In addition to the consideration of individual preferences, that I attempt to measure empirically with Best-Worst Scaling Discrete Choice Experiments in §6, modelling of overall utility may require consideration of how each measure of quality of life affects other capabilities. In their recent book, Wolff and De-Shalit (2007) argue convincingly (backed by empirical results) that some capabilities are more important than others as their provision is a necessary precondition of other capabilities. For example, education can enable employment opportunities, political representation via articulation of viewpoints, and a sense of self-worth.

Wolff and De-Shalit term these enabling capabilities *fertile functionings*. Wolff and De-Shalit also identify *corrosive disadvantage* as the absence of a key capability leading to the absence of other capabilities, for example: the absence of being able to speak the local language leading to an absence of community affiliation, societal integration and political involvement. I briefly consider how each area of quality of life may affect the others in §4.2.5.

From the perspective of the capabilities approach there are strong objections to combining different aspects of human life (capabilities and functionings) into a single utility metric (as is done for example, when calculating Disability Adjusted Life Year - DALY or Quality Adjusted Life Year - QALY in a Cost Utility Analysis), or even separate metrics for each of the four main domains of the WHOQoL-BREF (the psychometric approach to quality of life evaluation), as I do in this thesis. Nevertheless, the strategic importance of a single utility metric can still be recognised, as Nussbaum (2011) does for the case of the Human Development Index. The creation of an adequate, valid, and reliable single metric would require different research than I have attempted in this thesis, however. It would require a detailed consideration of the interaction between different areas of quality of life and capability in addition to the unstable nature (adaptation) or status-quo bias of individual preferences (a key criticism of utilitarianism that I highlighted in §2.1), and the difficulties of obtaining accurate preference weights in the first place due to the issues of heuristics and biases in how people complete choice tasks (see §5.4 and §5.5). Nevertheless, to illustrate how the creation of a single utility metric might work in practice, in §6.5.3 I have attempted a crude estimation of a multi-attribute single-metric utility function, using data, all collected as part of this doctoral study, from the Chichewa WHOQoL-BREF and preferences for different levels of each of its 27 quality of life attributes, from the same respondents, making a number of simplifying assumptions (see §6.6).

The unstable nature of individual preferences and the fact that the capabilities approach deliberately avoids taking account of them, in favour of taking account of all areas of quality of life (capabilities) separately and unweighted, is an important point as it can be argued that it invalidates the task of obtaining preferences i.e. invalidates all of the empirical work described in §6. If the purpose of the capabilities approach, or quality of life measurement, is to evaluate interventions aimed at improving them, however, then given that there can only be one decision on whether an intervention is adopted or not[11]; it follows that, whether explicitly calculated on a single-metric index or not, there must implicitly be a single metric on which the decision-maker has, either wittingly or unwittingly, traded-off the various qualitative and quantitative information she used to make her decision. I return to this discussion in §8. Obtaining preferences for each area of quality of life is also a useful end in itself as it provides interesting insights into how, in the context of my work, rural Malawian women see different areas of quality of life as being more or less important. Perhaps also, with reference to similar studies in other populations, these measurements could provide suggestions of potential adaptations to preferences due to the status quo of rural Malawian life in 2011. Supposing such an overall metric should and could be

[11] one might think that gradations of adoption, or adoption 'only in certain circumstances' or 'for certain people' means that there can be more than one 'yes'/'no' decision; however, even if the decision is to roll-out the intervention only 'a little bit' to a specific group, it has still been made with respect to what ever criteria the decision-maker used to make her decision - i.e. such a small roll-out should be considered a 'yes'.

produced from the WHOQoL-BREF it could have wide-ranging applications. It would provide a quick overview of quality of life, adjusted for preferences, of the population in question, and even of specific individuals within that population. Such overviews could be useful for planners and policymakers in areas such as, for example, understanding the quality of life of specific people in specific circumstances, and understanding how specific public or private-sector interventions they are charged with, affect quality of life. The specific application of cost-benefit analysis of health interventions is discussed further in §8.

Chapter 3

Development and Validation of the Chichewa WHOQoL-BREF

The WHOQoL-BREF has so far been translated and validated for use in many countries (Skevington et al., 2004) (for specific examples of individual countries see (e.g. Tsutsumi et al., 2006; Nedjat et al., 2008; Jaracz et al., 2006; Eser et al., 1999) but has not yet been validated in Malawi. Chichewa is the dominant spoken and written language and national language of Malawi, spoken by around two-thirds of the population, and understood by nearly all Malawians, especially in the populous central and southern regions (Kayambazinthu, 1998). Chichewa is also spoken in parts of Zambia, Zimbabwe and Mozambique (Kayambazinthu, 1998). This chapter describes the translation, adaptation, and piloting process that constitutes the validation of the WHOQoL-BREF in Malawi. Facet and domain scores, associations with socio-demographic scores, and internal consistency and discriminant validity of the questionnaire are all explored and discussed. A reduced version of this chapter, focusing on the quantitative validation, has recently been published: Colbourn et al. (2012a).

Following this foundation it is hoped that the Chichewa version of the WHOQOL-BREF will be used more frequently to evaluate the impact of a wide range of health, welfare and other interventions in the Malawian context.

3.1 Methods

Throughout the translation, adaptation, and piloting of the translated survey instrument we endeavoured to follow the protocol as set out in the WHOQoL user manual (WHO, 1998) and WHO Translation method (WHO, 2009). This part of my Ph.D. study took place between September 2009 and April 2010 (see Figure 1.4 on page 28 for how this fits in with the rest of the work undertaken).

3.1.1 Translation, Adaptation and Pre-testing

The English version of the WHOQoL-BREF was translated into the main local language of Malawi, Chichewa, collaboratively, by four English-Chichewa bilingual individuals, as required by the WHO translation method (WHO, 2009).

A question asking whether you get enough food to eat was added as this was felt by the study team to be a potentially important area of quality of life in the food-insecure Malawian context not covered in the standard WHOQoL-BREF. As required by the WHO, all of the 26 original questions were retained.

The initial Chichewa version was pre-tested, by one of the bilingual translators, on a group of four monolingual Chichewa speakers with little formal education, residing in a rural village in Lilongwe district. These individuals first each read through the questionnaire and then brought to the group the questions they did not understand, which were then discussed in relation to the specific words causing the confusion. The monolingual speakers only found two parts of the preamble and 4 of the 27 quality of life questions to be confusing, therefore finding the questionnaire to be generally comprehensible with only minor adaptations required (see § 3.2.1.1 on page 59 for further details). The bilingual translation group then undertook the suggested adaptations to the original wording in Chichewa.

The revised Chichewa document was then back-translated into English by a professional translator. The original English version was compared to the re-translated document. A few significant differences were found and these were re-translated and compared by the bilingual group, using the insights from the monolingual group, until equivalence in both languages was achieved as far as possible. A few problems with equivalence remained, as described below:

- Abstract words, which often do not have Chichewa equivalents, were the most difficult to translate e.g. 'standards' (in the instructions) required the translation team to opt for descriptive phrases such as in this case: '*mulingo omwe mumadziyika*' ('how you measure yourself or the level you put yourself at'; which was still confused with 'self-esteem' in the back-translation). Another abstract phrase with which the group had problems was 'quality of life'. There are a number of phrases to express this concept in Chichewa but most of them have another meaning different from the intended interpretation. For instance *ubwini wa moyo wanu* could also mean how beneficial is one's life.

- Other words in English seemed to imply a specific meaning whereas, in Chichewa, the related words were more general, such as the words chosen to translate 'enjoy' (*kusangalala* – to be happy), 'concentrate' (*chidwi/chomvetsera choyenera* – appropriate interest/attention), 'safe' (*otetezedwa* – protected), 'energy' (*mphamvu* – strength) and 'physical environment' (*malo amene mumapezeka kapena kukhala kawirikawiri* – the place you are found or usually stay). There is also no Chichewa word for 'gender'.

- Some concepts could be translated but the concepts themselves are difficult to understand because of cultural differences. For example, living as married was translated perfectly well but the idea of a couple living in the same house without being married does not exist in Malawian culture. The moment a couple start living in the same house in Malawi, they are

considered as being married regardless of whether they registered with the government or not, or whether they are recognised as such, by their religion or not. We assumed that the question was trying to establish the legal status of the relationship, so we distinguished this cultural kind of 'marriage' (living together) from one where the couple are legally registered as married by the District Commissioner or church.

The above problems required interviewers to clarify the meaning of any perceived ambiguities with respondents as they occurred. Interviewers were trained in this process to ensure that their clarifications were accurate and consistent.

The penultimate version of the questionnaire was tested on seven focus groups of between 10 and 15 people from rural villages, who discussed its content and relevance to quality of life in Malawi. The focus group discussions were recorded, transcribed and the transcripts translated from Chichewa to English. Iterative thematic analysis was then undertaken on the transcripts. The results of this qualitative validation of the questionnaire, are presented in § 3.2.1.2 on page 60. Feedback from the qualitative validation of the questionnaire was incorporated into the final version of the questionnaire. The final Chichewa WHOQoL-BREF used in this pilot study is provided in Appendix F on page 311 (see Appendix E for the English version).

3.1.2 Survey Conduct

Piloting of the Chichewa WHOQOL-BREF was undertaken among 250 people with a variety of ill-health conditions and 50 healthy people as required by the WHO. The survey was conducted among a convenience quota sample at Kamuzu Central Hospital (KCH) and was interviewer-administered by two research assistants trained in data collection. KCH is the main referral hospital for the Central Region of Malawi, located in the capital Lilongwe; 259 people with various diagnoses and disabilities in a range of in-patient wards and 26 healthy respondents, often friends/relatives/guardians of the in-patients, were surveyed at KCH. The interviewers focused on different wards of the hospital each day, covering a range of wards and patients with different health conditions. After approaching a patient with an initial question asking if they were well enough to talk to the interviewer, the interviewer explained the study to the respondent and if the respondent then gave informed consent to participate, the interviewer then proceeded to go though the questionnaire with them. A peri-urban area of Lilongwe (Area 18) and rural villages outside Lilongwe city contributed 24 healthy respondents, with the same procedure for informed consent followed.

The mean questionnaire completion time was 19 minutes (standard deviation: 5 minutes).

Only 8 of the people who were approached to take part in the survey refused, giving a high response rate of 97.4%. The majority of those who refused did not feel well enough to complete the survey.

3.1.3 Calculation of Domain Scores

All analyses presented here were done using Stata 11.2 for Mac (StataCorp, 2009) (see Appendix V for the Stata .do-file code) and are reported using the wording of the original English

version of the WHOQoL-BREF (see Appendix E). The SPSS syntax given in the WHOQoL user manual (WHO, 1998) was followed and domain scores were calculated accordingly, using the formulae given:

$$Physical\,domain = 4((6 - q3) + (6 - q4) + q10 + q15 + q16 + q17 + q18) \tag{3.1}$$

$$Psychological\,domain = 4(q5 + q6 + q7 + q11 + q19 + (6 - q26)) \tag{3.2}$$

$$Social\ Relationships\,domain = 4(q20 + q21 + q22) \tag{3.3}$$

$$Environment\,domain = 4(q8 + q9 + q12 + q13 + q14 + q23 + q24 + q25) \tag{3.4}$$

$$Transformation\,of\,domain\,score\,to\,0{-}100\,scale: TRANSFORMED\,SCORE = (SCORE{-}4)\cdot(100/16) \tag{3.5}$$

3.1.4 Validity Testing

The internal validity of the Chichewa WHOQoL-BREF was assessed by quantitative analyses examining internal consistency, domain structure, discriminant validity and convergent validity. External validity was assessed by qualitative validation through focus group discussions.

Internal Consistency was determined by calculating Cronbach's Alpha for each of the four domains. The validity of the domain structure was determined by calculating Pearson's Correlation Coefficients for the associations between each item (question) and each domain and determining which domain each item was most correlated to. Following Nedjat et al. (2008) and Webster et al. (2010), correlations >0.45 were considered acceptable.

Socio-demographic variables and variables assessing discriminant validity were regressed against the four main domain scores and the overall quality of life, and health domain scores using OLS regression. Each variable was separately regressed first. For each domain, this was followed by testing all socio-demographic variables at once and removing p>0.1 variables sequentially and finally removing p>0.05 variables to arrive at restricted multivariate models. The variables assessing discriminant validity (depression (on a 1-5 scale: question 26 of the questionnaire, and disability weight on a 0 to 1 scale) were then re-tested by addition to the restricted multivariate models.

Disability weights for respondent health conditions were obtained by matching with those provided by the Global Burden of Disease 2004 study (WHO, 2004) (see Appendix H on page 325) and were used to assess discriminant and convergent validity of the questionnaire by regressing the weights against domain scores. The regression analyses were not prescribed by WHO, but are considered best practice (Skevington et al., 2004).

External validity was assessed qualitatively, first by a group of four monolingual Chichewa

speakers, and then by seven focus groups discussions of rural villagers, as described in § 3.1.1 on page 56 above.

3.2 Results

3.2.1 Qualitative Evaluation

3.2.1.1 Pretesting with Monolingual Chichewa speakers

The testing of the initial Chichewa version of the questionnaire on monolingual Chichewa speakers yielded the following observations. After reading the questionnaire, each person brought to the group those questions that they found difficult to comprehend. There were very few questions with which they had problems. Below are the questions/words that they had problems with and in most cases, the questions each one of them noted were common to all.

- On page 1 preamble on question: *Kodi muli pabanja?* (What is your marital status?) The third option *timakhala pamodzi koma sitinakwatilane* (living as married) their understanding was the two are in a relationship that is not recognised by parents/elders, as such, one may sneak into the other's home for sex, especially at night.
- They had problems with the instructions on page 1: Please keep in mind your standards, hopes *...kumbukilani mulingo omwe mumadziyika, ziyembekezo...muganizile za moyo wanu m'sabata ziwiri zapitazi.* They could not at first comprehend the instruction until they studied the questions again.
- For Question 16 *kodi ndinu okhutitsidwa bwanji ndi tulo timene mumapeza mukagona?* Their understanding was you may not have satisfaction lacking sleep as result of personal problems.
- The very last question: *Kodi ndi kawirikawiri bwanji pomwe mumakhala oskaondwa ...?* How often do you have negative feelings...? The word *kawirikawiri* caused confusion in one of the participants but another explained it as meaning *motsatizana/amayandikirana bwanji bwanji?* Which translates to how often, which they agreed upon.
- For question 11 *kodi mutha kuvomereza momwe maonekedwe anu alili?* Are you able to accept your bodily appearance? They felt the option *pang'ono* (a little) is not appealing; it should be *ayi; kwambiri;* or, *kwambiri zedi* (no; very much; or, yes completely).
- Question 21 How satisfied are you with your sex life? Their first impression was: is there trust between the two people? But later, they came to conclude that the question asks if, after having sex do they feel contented?

Most of these problems were due to differences in opinion. Such differences would be unlikely to affect how respondents complete the questionnaire considering that the questionnaire was administered by trained interviewers who were able to clarify any points of confusion regarding the wording of the questions.

3.2.1.2 Focus Group Discussions

During focus group discussions (FGD) with women's group members, participants were given copies of the penultimate Chichewa version of the WHOQOL-BREF and asked "*are these good questions to ask a person in order to know about their quality of life?*" and specifically, for each of the 27 questions in turn: *"is this question helping to assess quality of life?*" (see Appendix L on page 358 for full FGD protocol and topic guide). The women's responses were almost exclusively positive, with the women indicating that the WHOQQoL-BREF questions were good questions to ask and were helpful to assess quality of life. In some cases, however, responses were ambiguous, indicating that they had not understood the WHOQOL-BREF question as it is intended to be understood. The full thematic analysis of responses is provided as Appendix G on page 316[1]. A summary, focusing on the more substantial responses, is as follows.

When asked about each of the WHOQoL-BREF questions in turn, the respondents typically indicated that they thought the questions were appropriate to ask, and useful, as they would help someone find out about the quality of a person's life. The thematic analysis (see Appendix G) identified many good examples of respondents justifying why they thought a specific WHOQoL-BREF question was appropriate, with reference to aspects of their lives or other hypothetical people in similar circumstances. Examples of such responses were: in relation to question 1. *How would you rate your quality of life?*:

"*Because once one asks how satisfied one is with her life she will answer according to her household; how satisfied she is with her household whether she has no sickness in the body and is able to find food without difficulties*" [FGD3]

; in relation to question 3. *To what extent do you feel that (physical) pain prevents you from doing what you need to do?*:

"*It does help to measure whether one has good life because once one is sick today, sick the following day, he tends to doubt whether things are going to work out for him that year*" [FGD3]

; in relation to question 10. *Do you have enough energy for everyday life?*:

"*The question is appropriate because by answering that you are strong it indicates your capability to work, how can someone who is weak work*" [FGD3.p5]

; and in relation to question 27. *To what extent do you have enough food to eat?*; which was added to the Chichewa version of the questionnaire (see §3.1.1):

"*It is an appropriate question... ...When someone asks whether one has enough food in the household, they want to establish if the food is enough. Sometimes I have enough food, while sometimes not. As I am speaking I am coming from doing casual labour where its payment is*

[1] please note that in addition to qualitative validation of the Chichewa WHOQOL-BREF, these focus groups (especially the later ones) were also focused on gathering data on the opinions of women's group members with respect to associations between women's groups and the areas of quality of life captured by the WHOQOL-BREF (see §4.2.4), which were used to triangulate quantitative associations examined in §4, especially §4.2.

cassava because I have no food in my household. Sometimes those asking you may wish to help you" [FGD3.p6]

Respondents indicated that other questions of the WHOQoL-BREF were, however, more likely to cause confusion. For example, in relation to question 6. *To what extent do you feel your life to be meaningful?*:

"*If one was going to be asked that question he would be too confused to give an answer*" [FGD3.p1]

"*The question is difficult*" [FGD3]

Comments such as these, were stated for WHOQoL-BREF questions 7, and 14 in addition to question 6. In most cases, however, following explanation of the question by the focus group moderator, respondents indicated that explanation by the interviewer would help resolve such confusion.

For other WHOQoL-BREF questions, although participants did not reply to the moderators' questions to say that they thought the WHOQoL-BREF question would cause confusion, some of their responses indicated that they did not completely understand the WHOQoL-BREF question. Responses indicating a lack of understanding were observed for WHOQoL-BREF questions 2, 5, 9, and 11.[2] Also considering the questions that the participants explicitly stated that they had trouble understanding, discussed in the previous paragraph, it is apparent that the questions of the psychological domain of the WHOQoL-BREF caused the most confusion, and the social relationships domain the least (see §3.1.3 above for which questions comprise each of the multi-attribute domains of the WHOQoL-BREF). However, it should be recognised that the WHOQoL-BREF was interviewer-administered in the studies described in this thesis, precisely to avoid such misunderstandings of the questions. Examples of responses showing a lack of understanding of the WHOQoL-BREF question include, in relation to question 2. *How satisfied are you with your health?*:

"*It is appropriate because we have a quality life*" [FGD6.p3]

; and in relation to question 5. *How much do you enjoy life?*:

"*The question is appropriate because when it is asked to a woman she has to know who she is*" [FGD3.p5]

Because question 21. *How satisfied are you with your sex life?* was refused by about a third of respondents to both the pilot (§3.3.1) and main (§4) WHOQoL-BREF studies, it is interesting to examine how appropriate the participants of the focus groups thought this question to be.

[2] see Appendix G. Note that the focus of this section is on lack of understanding related to whether each WHOQoL-BREF question is "*helping to assess quality of life?*" rather than on lack of understanding in whether the answer to the WHOQoL-BREF question is likely to be different between women's group members and non-members, which is also covered in the thematic analysis of Appendix G and is discussed in relation to the main WHOQoL-BREF in § 4.2.4 on page 95.

In general respondents did think question 21 was acceptable and appropriate; although some respondents were conceptualising it in terms of health, e.g. HIV and maternity, or even in terms of trust between the sexual partners. The conceptualisation of the question as being in terms of trust was also the first impression of one of the monolingual validation group (see §3.2.1.1 above). Due to the cultural inseparability of sex with (a man and a woman) living together, and marriage (see the discussion of the martial status category 'living together as married' in §3.1.1 above), the moderator asked about this question in terms of sex with the woman's husband, a typical response being:

"*The question is appropriate, because once people are married, there is no way they can be sleeping separately but together as an indication of marriage*" [FGD3.p1] {moderator asks question in terms of sex with spouse - as sex outside of marriage is a taboo subject, especially for women}

WHOQoL-BREF question 8. *How safe do you feel in your daily life?* was also conceptualised in terms of health and bodily security, and especially in terms of the threat posed by HIV, by some focus group participants. For example, one participant indicated that it was important to take blood tests to be secure in the knowledge that you or your partner did not have HIV. This suggests that question 8. on security could map onto the capability 'bodily integrity' (see Table 2.1 on page 51) through more than one pathway.

General opinions regarding the WHOQoL-BREF questions (see end of Appendix G) included responses that the questions were related to human life, related to women's groups, and that they taught people things. A couple of respondents also indicated that others may not understand the questions, for example:

"*They are going to understand considering one's intelligence that maybe this response is related to a human being. But if a person has difficulties to find words to say at that level, she will not be able to respond.*" [FGD6.p9]

Overall, however, the results of the initial qualitative evaluation of the WHOQoL-BREF provide a vote of confidence in the questionnaire from rural Malawian women. This is mainly for two reasons. Firstly, the general interest and enthusiasm expressed by the participants of the focus groups toward the WHOQoL-BREF questions, which was also characterised by the participants providing numerous examples of how each question was appropriate and relevant to her (or someone else's) life. Secondly, the fact that the minority of incidences of explicit or implicit confusion or lack of understanding were cleared up by further explanation of the moderator, which suggests any such confusion in interviewer-administered survey situations should be resolved by the interviewer.

3.2.2 Respondent Characteristics

The sample and demographic characteristics of the respondents are provided in Table 3.1: 259 were sick, 50 were healthy; 61% were female, 6% had no education, 32% primary education, 45%

Table 3.1: Respondent Characteristics of WHOQoL-BREF Pilot study

		Total respondents (n=309)
Respondent Characteristics		n	%
Category			
Sick (KCH)		259	83.8%
Healthy (KCH)		26	8.4%
Healthy (village)		24	7.8%
Gender			
male		121	39.2%
female		188	60.8%
Education			
None		18	5.8%
Primary		99	32.0%
Secondary		139	45.0%
Tertiary		53	17.2%
Marital Status			
Single		69	22.3%
Married		181	58.6%
Living as Married		8	2.6%
Separated		11	3.6%
Divorced		13	4.2%
Widowed		27	8.7%
Age	mean		36.8
	std. dev.		13.7
	min.		17
	max.		80

secondary education and 17% tertiary; most were either married (59%) or single (22%) with minorities living as married (3%), separated (4%), divorced (4%) or widowed (9%); the mean age was 36.8 (std. dev.: 13.7). Respondent characteristics broadly match those of the general population as detailed in the 2004 Malawi DHS (National Statistics Office (NSO) [Malawi] and ORC Macro [USA], 2005) except for there being fewer 18-25 year olds, the respondents having higher levels of education on average, and there being more widowed and fewer married respondents in our sample. The first two differences are likely due to the survey predominantly taking place in the central hospital in Lilongwe, a place less accessible to poorer more remote rural communities. More respondents were female because the majority of the guardians of patients (22/26) and all 10 of those with sick children were female, as is traditional in Malawi.

As stipulated in the criteria for piloting the WHOQoL-BREF (WHO, 1998), the respondents interviewed had a wide range of illnesses and health problems; corresponding to a wide range of disability weights (see Appendix H).

3.2.3 Facet Scores

Table 3.2 presents the frequencies, distributions and averages of the responses to each of the 27 facets (questions) included in the final Chichewa version of the WHOQoL-BREF. Question 1 constitutes a separate domain of the WHOQoL-BREF which seeks to measure overall quality of life (WHO, 1998). Question 2 is also considered as a separate domain which is intended to measure overall health-related quality of life (WHO, 1998). The other questions map onto the four domains, as detailed in Table 3.5, discussed in §3.2.6 below.

Table 3.2: Distribution of responses to all WHOQoL-BREF questions in Pilot study

	Survey Question	Response[1]												Distribution[2]
		1 = Very poor		2 = Poor		3 = Neither poor nor good		4 = Good		5 = Very good		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
1	How would you rate your quality of life?	12	4%	26	9%	74	25%	139	46%	49	16%	0		
		1 = Very dissatisfied		2 = Dissatisfied		3 = Neither satisfied or dissatisfied		4 = Satisfied		5 = Very satisfied		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
2	How satisfied are you with your health?	6	2%	55	18%	92	31%	116	39%	31	10%	0		
		1 = An extreme amount		2 = Very much		3 = A moderate amount		4 = A little		5 = Not at all		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
3	To what extent do you feel that (physical) pain prevents you from doing what you need to do?	14	5%	54	18%	61	20%	125	42%	46	15%	0		
4	How much do you need any medical treatment to function in your daily life?	26	9%	64	21%	71	24%	88	29%	51	17%	0		
		1 = Not at all		2 = A little		3 = A moderate amount		4 = Very much		5 = An extreme amount		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
5	How much do you enjoy life?	0	0%	24	8%	80	27%	168	56%	28	9%	0		
6	To what extent do you feel your life to be meaningful?	2	1%	11	4%	28	9%	147	50%	109	37%	3		
		1 = Not at all		2 = A little		3 = A moderate amount		4 = Very much		5 = Extremely		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
7	How well are you able to concentrate?	6	2%	47	16%	76	25%	118	40%	52	17%	1		
8	How safe do you feel in your daily life?	8	3%	24	8%	78	26%	123	41%	67	22%	0		
9	How healthy is your physical environment?	8	3%	35	12%	69	23%	137	46%	51	17%	0		
		1 = Not at all		2 = A little		3 = Moderately		4 = Mostly		5 = Completely		missing data		
		n	%	n	%	n	%	n	%	n	%	n		
10	Do you have enough energy for everyday life?	18	6%	88	29%	82	27%	80	27%	32	11%	0		
11	Are you able to accept your bodily appearance?	5	2%	6	2%	33	11%	151	51%	99	34%	6		
12	Have you enough money to meet your needs?	26	9%	59	20%	114	38%	91	30%	10	3%	0		
13	How available to you is the information that you need in your day-to-day life?	19	6%	53	18%	94	31%	113	38%	21	7%	0		
14	To what extent do you have the opportunity for leisure activities?	30	10%	58	19%	83	28%	107	36%	21	7%	1		
27	To what extent do you have enough food to eat?	7	2%	21	7%	73	24%	164	55%	35	12%	0		

continued on next page

	Survey Question	Response[1] 1 = Very poor n	%	2 = Poor n	%	3 = Neither poor nor good n	%	4 = Good n	%	5 = Very good n	%	missing data n	Distribution[2]
15	How well are you able to get around?	16	5%	52	18%	78	26%	108	37%	41	14%	5	
		1 = Very dissatisfied n	%	2 = Dissatisfied n	%	3 = Neither satisfied or dissatisfied n	%	4 = Satisfied n	%	5 = Very satisfied n	%	missing data n	
16	How satisfied are you with your sleep?	7	2%	38	13%	64	21%	154	51%	37	12%	0	
17	How satisfied are you with your ability to perform your daily living activities?	20	7%	52	17%	67	22%	103	34%	58	19%	0	
18	How satisfied are you with your capacity for work?	20	7%	44	15%	67	22%	99	33%	70	23%	0	
19	How satisfied are you with yourself?	3	1%	9	3%	37	12%	152	51%	98	33%	1	
20	How satisfied are you with your personal relationships?	1	0%	18	6%	49	16%	153	51%	79	26%	0	
21	How satisfied are you with your sex life?	10	5%	18	9%	39	20%	71	37%	54	28%	108	
22	How satisfied are you with the support you get from your friends?	7	2%	20	7%	62	21%	171	57%	40	13%	0	
23	How satisfied are you with the conditions of your living place?	23	8%	54	18%	79	26%	121	40%	23	8%	0	
24	How satisfied are you with your access to health services?	3	1%	48	16%	105	35%	125	42%	19	6%	0	
25	How satisfied are you with your transport?	13	4%	62	21%	122	41%	89	30%	14	5%	0	
		1 = Always n	%	2 = Very often n	%	3 = Quite often n	%	4 = Seldom n	%	5 = Never n	%	missing data n	
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	5	2%	19	6%	52	17%	146	49%	78	26%	0	

[1]Percentages are of those answering the question. Note that only question 21 has a significant number of non-responders.

[2]A visual representation of the range of responses is provided for each question. The x axis of each graph goes from 1 to 5 from left to right. The y axis gives the frequency of each response (note that the scale of the y axis varies between questions as some questions have a more skewed distribution of responses than others). Distributions skewed further towards the right are good for all questions. Please note that questions 3, 4 and 26 have been recoded (reversed: 1=5; 2=4; 3=3; 4=2; 5=1) in the database so that 1 is bad and 5 is good to match the other questions and to calculate the overall domain scores.

3.2.4 Floor and Ceiling effects

The proportion of respondents reporting the lowest (floor) and highest (ceiling) scores of each facet gives an indication of which facets have the biggest effect on the overall measures of quality of life: the domain scores (Table 3.3). Table 3.3 also ranks the floor and ceiling effects within each domain to allow better visualisation of which items affect their domain scores the most. In all of the domains ceiling effects are greater than floor effects because the data for all facets are skewed towards higher values (see right-most column in Table 3.2). In the physical domain, work capacity (q18) has the highest ceiling effect and the second highest floor effect, and dependence on medical treatment (q4) and activities of daily living (q17) also have relatively high floor and ceiling effects. In the psychological domain, which has the highest average score (see §3.2.5 below), floor effects are minimal, and personal belief (q6), bodily image (q11) and self-esteem (q19) have the highest ceiling effects. Of the three facets that make up the social relationships domain, sexual activity (q21) has both the highest floor effect and the highest ceiling effect. In

the environment domain, security (q8) and physical environment (q9) have the first and second highest ceiling effects, and leisure activity (q14) has the highest floor effect.

3.2.5 Domain Scores

The environmental domain has the lowest score, followed by the physical domain, the social domain and the psychological domain (Table 3.4; constituent facets of each domain are detailed in Table 3.3). The distributions of the psychological, social relationships and overall quality of life domain scores, are more skewed towards 100 than those of the other domains. The added question regarding whether you have enough food to eat (item 27) was not included in the calculation of the Environment domain score so as to ensure the relevance of cross-country comparisons with this study. The environmental domain also scored lowest in WHOQoL-BREF validation studies in Iran (Nedjat et al., 2008), Bangladesh (Tsutsumi et al., 2006) and Poland (Jaracz et al., 2006) although the ranking of the other domain scores were different. For the 24 countries undergoing testing of the WHOQoL-BREF during its initial development, on average, the environmental domain also scored lowest, followed by the social domain, psychological domain and the physical domain as the highest (Skevington et al., 2004), the order of the other three domain scores also differing from my study. Given the context of each country differs in socio-economic, political, cultural, demographic and a multitude of other ways, we should expect to see differences between countries in average domain scores and their relative ordering.

3.2.6 Internal Consistency

Cronbach's Alpha scores assess the internal consistency of each domain score based on the correlations between all responses to each of the questions comprising the domain. Alpha scores greater than, or equal to, 0.7 are considered to denote adequate internal consistency. Using this criterion, all domains were found to have adequate internal consistency (see Table 3.5). Studies in other countries have noted problems with the internal consistency of the Social Relationships domain reporting Alpha scores as low as 0.55 (Skevington et al., 2004; Tsutsumi et al., 2006; Nedjat et al., 2008). This may be partly due to the fact that it is made up of only 3 items. Although this domain had the lowest Alpha score in our dataset (0.694), it was not significantly different to the threshold value of 0.7.

The validity of the domain structure was also assessed by calculating Pearson's Correlation Coefficients for the relationship between each of the facet (question/item) scores and each of the four domain scores. All 27 items were found to be most correlated to the domain to which they are assigned, with all correlations greater than, or equal to, 0.60. This value, is significantly higher than the 0.40 (Nedjat et al., 2008) or 0.45 (Webster et al., 2010) threshold for acceptability given in other studies (Table 3.5).

3.2.7 Associations with Socio-Demographic Variables

Previous studies have shown WHOQoL-BREF domain scores to be associated with age (e.g. Baumann et al., 2010; Hanestad et al., 2004) education (e.g. Hanestad et al., 2004; Noerholm

Table 3.3: Floor and Ceiling effects in Pilot WHOQoL-BREF study

	Floor effects		Ceiling effects	
	%	Rank	%	Rank
Physical (item no.)				
Work capacity (18)	7%	2	**23%**	**1**
Dependence on medical treatment (4)	**9%**	**1**	17%	3
Activities of daily living (17)	7%	2	19%	2
Physical Pain (3)	5%	6	15%	4
Mobility (15)	5%	5	14%	5
Energy (10)	6%	4	11%	7
Sleep (16)	2%	7	12%	6
Psychological (item no.)				
Personal belief (6)	1%	5	**37%**	**1**
Bodily image (11)	2%	2	34%	2
Self-esteem (19)	1%	4	33%	3
Negative feeling (26)	2%	2	26%	4
Concentration (7)	**2%**	**1**	17%	5
Enjoyment of life (5)	0%	6	9%	6
Social Relationships (item no.)				
Sexual activity (21)	**5%**	**1**	**28%**	**1**
Personal relationships (20)	0%	3	26%	2
Support from friends (22)	2%	2	13%	3
Environment (item no.)				
Security (8)	3%	6	**22%**	**1**
Physical environment (9)	3%	6	17%	2
Leisure activity (14)	**10%**	**1**	7%	4
Living conditions (23)	8%	3	8%	3
Financial secuity (12)	9%	2	3%	8
Information availability (13)	6%	4	7%	4
Transport (25)	4%	5	5%	7
Health care accessibility (24)	1%	8	6%	6
Enough food (27)[1]	*2%*		*12%*	

[1]Extra item added to Chichewa WHOQoL-BREF

Table 3.4: Domain Scores from WHOQoL-BREF Pilot study

Quality of Life Domain	min	max	mean	std. dev.	skewness
Physical (PHYS)	3.6	100	60.3	19.59	-0.44
Psychological (PSYCH)	16.7	100	73.3	14.89	-0.89
Social Relationships (SOCIAL)	8.3	100	70.6	17.97	-0.66
Environmental (ENVIR)	9.4	93.8	57.6	16.82	-0.46
Overall (q1)	1	5	3.6	0.99	-0.73
Health (q2)	1	5	3.4	0.97	-0.25

Table 3.5: Correlations of Items and Domains of the WHOQoL-BREF in the Pilot study

	Physical	Psychological	Social	Environment	Cronbach's alpha
Physical (item no.)					0.823
Physical Pain (3)	**0.67**	0.17	0.08	0.17	
Dependence on medical treatment (4)	**0.68**	0.25	0.09	0.23	
Energy (10)	**0.60**	0.27	0.06	0.18	
Mobility (15)	**0.72**	0.44	0.30	0.54	
Sleep (16)	**0.63**	0.56	0.46	0.57	
Activities of daily living (17)	**0.75**	0.31	0.17	0.32	
Work capacity (18)	**0.77**	0.31	0.20	0.27	
Psychological (item no.)					0.783
Enjoyment of life (5)	0.30	**0.72**	0.38	0.52	
Personal belief (6)	0.20	**0.74**	0.30	0.36	
Concentration (7)	0.28	**0.64**	0.33	0.44	
Bodily image (11)	0.36	**0.71**	0.29	0.39	
Self-esteem (19)	0.43	**0.73**	0.43	0.54	
Negative feeling (26)	0.36	**0.63**	0.43	0.53	
Social Relationships (item no.)					0.694
Personal relationships (20)	0.23	0.50	**0.80**	0.50	
Sexual activity (21)	0.42	0.48	**0.79**	0.37	
Support from friends (22)	0.09	0.30	**0.79**	0.43	
Environment (item no.)					0.828
Security (8)	0.38	0.50	0.30	**0.66**	
Physical environment (9)	0.20	0.53	0.32	**0.67**	
Financial secuity (12)	0.32	0.53	0.35	**0.71**	
Information availability (13)	0.40	0.51	0.36	**0.75**	
Leisure activity (14)	0.43	0.49	0.37	**0.70**	
Living conditions (23)	0.18	0.33	0.47	**0.63**	
Health care accessibility (24)	0.21	0.28	0.42	**0.60**	
Transport (25)	0.33	0.42	0.36	**0.68**	
Enough food (27)[1]	*0.29*	*0.53*	*0.30*	***0.61***	

[1]Extra item added to Chichewa WHOQoL-BREF

Correlation of > 0.45 was considered satisfactory.

et al., 2004), marital status (e.g. Hanestad et al., 2004) and gender (e.g. Baumann et al., 2010; Hanestad et al., 2004; Noerholm et al., 2004) to differing extents in different populations (Saxena et al., 2001). Associations of these variables with each of the domain scores were assessed by univariate regression analysis (Table 3.6a). Notable associations include physical domain, psychological domain and health domain scores deteriorating with age; all domain scores except social relationships being higher in those with tertiary education; the physical, psychological and environmental domains being higher in those who are single (compared to married) and those living as married (although n=6 for this group) who additionally have higher health domain scores (Table 3.6a).

Subsequent multivariate analyses (Table 3.6b) show that many of the univariate associations are not significant when controlling for other variables. Physical domain scores are higher in those with tertiary education and for those living as married (compared to married) and lower in those who are older, especially at older ages (age^2 is negative and significant). Psychological domain scores are lower in healthy respondents attending patients at KCH (as also shown in numerous previous studies (Pinquart and Sorensen, 2003)), higher in tertiary-educated respondents and those single or living as married. Social domain scores were not significantly associated with any of the variables assessed. Environmental domain scores are higher in those single or living as married. Overall domain scores are slightly higher in those with secondary and tertiary education. Health domain scores are lower in older respondents (Table 3.6b).

The R^2 values for all of the regression models were fairly low, meaning that the variation in each domain score was not well explained by the socio-demographic variables included in the model alone. This is perhaps as expected, considering that many more factors are likely to influence an individual's quality of life than gender, age, education and marital status. Given the high likelihood of the regressions suffering from omitted variable bias the results should be interpreted cautiously.

3.2.8 Discriminant Validity

This section examines associations between the four main domain scores and overall quality of life (q1), health (q2), depression (q26), and disability weights associated with respondents' specific health problems (see methods). Associations were determined by univariate regression and by addition of the variables to restricted multivariate models as described in the methods.

Overall quality of life is positively associated with all four main domain scores and the health domain score (increase of 6-11 points on 0-100 scale of four main domains, and 0.4 on the 1-5 scale of health domain, per 1 increase on 1-5 scale of overall domain – univariate regressions: Table 3.6a; multivariate regressions show slightly lower increases: Table 3.6c).

The overall health domain is also significantly positively associated with all four domains and the overall quality of life domain (increase of 4-7 points on 0-100 scale of four main domains, and 0.4 on the 1-5 scale of overall domain, per 1 increase on 1-5 scale of health domain – univariate regressions: Table 3.6a). However, after controlling for the remaining variables from the restricted multivariate regressions (Table 3.6b) and for overall quality of life, the associations with the Psychological, Social, and Environmental domains disappear (Table 3.6c).

Table 3.6: Regressions of respondent characteristic variables including states assessing discriminant validity on quality of life domains - WHOQoL-BREF Pilot study

a) Univariate Regressions (separate regr. for each variable)	Physical domain (0-100 scale)		95%CI		Psychological domain (0-100 scale)		95%CI		Social domain (0-100 scale)		95%CI		Environmental domain (0-100)		95%CI		Overall domain (q1; 1-5 scale)		95%CI		Health domain (q2; 1-5 scale)		95%CI	
Independent variable	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Category: Reference=Sick(KCH)																								
Healthy (KCH)	1.2	0.763	-6.7	-9.1	***-6.3***	***0.038***	***-12.4***	***-0.3***	2.1	0.568	-9.4	5.2	-4.9	0.157	-11.7	1.9	-0.33	0.105	-0.73	0.07	***0.47***	***0.018***	***0.08***	***0.86***
Healthy (village)	***9.0***	***0.032***	***0.8***	***17.2***	1.2	0.701	-5.0	-7.4	3.1	0.425	-4.5	10.6	-3.2	0.374	-10.3	3.9	-0.22	0.302	-0.63	0.20	0.29	0.160	-0.12	0.69
Gender: Reference=male																								
female	-2.7	0.237	-7.2	1.8	-1.9	0.270	-5.3	1.5	2.5	0.231	-1.6	6.6	0.7	0.720	-3.2	4.6	0.03	0.781	-0.20	0.26	0.11	0.328	-0.11	0.33
Education: Reference=None																								
Primary	3.4	0.467	-5.9	12.8	0.8	0.831	-6.4	8.0	1.8	0.694	-7.2	10.9	-1.0	0.817	-9.3	7.3	0.19	0.450	-0.30	0.67	0.33	0.179	-0.15	0.82
Secondary	**12.6**	**0.007**	**3.5**	**21.7**	7.2	0.440	0.2	14.2	1.8	0.681	-7.0	10.7	3.8	0.357	-4.3	11.9	0.34	0.159	-0.13	0.82	0.42	0.0805	-0.05	0.90
Tertiary	**21.6**	**2E-05**	**11.7**	**31.6**	**13.4**	**6E-04**	**5.8**	**21.1**	6.6	0.177	-3.0	16.3	***9.9***	***0.029***	***1.0***	***18.7***	**0.82**	**0.002**	**0.30**	**1.34**	***0.59***	***0.027***	***0.07***	***1.10***
Marital Status: Reference=Married																								
Single	***6.8***	***0.010***	***1.6***	***12.0***	**7.3**	**4E-04**	**3.3**	**11.3**	-0.4	0.885	-5.4	4.6	**6.9**	**0.003**	**2.3**	**11.6**	0.27	0.0573	-0.01	0.54	0.12	0.399	-0.15	0.38
Living as Married	**20.1**	**0.003**	**6.8**	**33.4**	**15.2**	**0.004**	**5.0**	**25.5**	11.6	0.0754	-1.2	24.3	**15.9**	**0.008**	**4.1**	**27.6**	0.30	0.399	-0.40	1.00	***0.73***	***0.036***	***0.05***	***1.42***
Separated	-16.0	0.432	-16.0	6.8	-4.7	0.293	-13.5	4.1	-6.7	0.230	-17.7	4.3	0.4	0.943	-9.7	10.5	-0.30	0.325	-0.90	0.30	-0.48	0.107	-1.07	0.10
Divorced	-1.0	0.858	-11.5	9.6	1.3	0.750	-6.8	9.5	2.4	0.648	-7.8	12.5	3.3	0.488	-6.0	12.6	0.12	0.678	-0.44	0.67	0.07	0.802	-0.47	0.61
Widowed	**-15.0**	**1E-04**	**-22.6**	**-7.4**	-3.8	0.206	-9.6	2.1	-2.2	0.553	-9.5	5.1	-1.2	0.725	-7.9	5.5	-0.06	0.783	-0.46	0.34	-0.28	0.157	-0.67	0.11
Ill: Reference category=not ill	-4.9	0.103	-10.9	1.0	2.7	0.238	-1.8	7.2	-0.4	0.893	-5.8	5.1	4.1	0.116	-1.0	9.2	0.28	0.0705	-0.02	0.58	***-0.38***	***0.010***	***-0.68***	***-0.09***
Age (years)	**-0.44**	**4E-08**	**-0.59**	**-0.29**	**-0.17**	**0.007**	**-0.29**	**-0.46**	-0.02	0.745	-0.17	0.12	-0.129	0.0643	-0.266	0.008	-0.003	0.460	-0.011	0.005	**-0.017**	**2E-05**	**-0.025**	**-0.009**
Age^2	**-0.0053**	**5E-09**	**-0.0070**	**-0.0036**	***-0.0017***	***0.015***	***-0.0031***	***-0.0033***	-8E-05	0.927	-0.002	0.002	-0.001	0.0916	-0.003	0.0002	-1E-05	0.803	0.000	-8E-05	**-0.0002**	**3E-05**	**-0.0003**	**-0.0001**
q1 (overall QoL, per 1 on 1-5 scale)	**6.4**	**6E-09**	**4.3**	**8.5**	**8.7**	**0**	**7.3**	**10.1**	**6.8**	**0**	**4.9**	**8.7**	**11.1**	**0**	**9.6**	**12.6**					**0.41**	**0**	**0.31**	**0.51**
q2 (overall health, per 1 on 1-5 scale)	**7.2**	**1E-10**	**5.0**	**9.3**	**4.2**	**1E-06**	**2.6**	**5.9**	**4.1**	**1E-04**	**2.0**	**6.1**	**4.4**	**7E-06**	**2.5**	**6.3**	**0.43**	**0**	**0.32**	**0.53**				
q26 (Depression, per 1 on 1-5 scale)	**8.0**	**0**	**5.8**	**10.3**	**10.5**	**0**	**9.1**	**11.9**	**8.7**	**0**	**6.7**	**10.7**	**10.0**	**0**	**8.3**	**11.8**	**0.47**	**0**	**0.37**	**0.58**	**0.27**	**6E-06**	**0.16**	**0.39**
Disability weight of illness (0-1 scale)	**-23.3**	**0.005**	**-39.4**	**-7.1**	3.7	0.536	-8.1	15.6	4.0	0.564	-9.7	17.7	8.7	0.18	-4.0	21.5	0.4	0.304	-0.4	1.2	***-0.8***	***0.042***	***-1.5***	***0.0***
b) Multivariate Restricted models[a]																								
Category: Reference=Sick(KCH)																								
Healthy (KCH)					***-6.0***	***0.043***	***-11.7***	***0.2***																
Healthy (village)					2.0	0.512	-3.9	7.9																
Gender: Reference=male																								
female																								
Education: Reference=None																								
Primary	0.2	0.966	-9.0	9.4	0.8	0.819	-6.3	7.9									0.33	0.182	-0.16	0.82				
Secondary	5.0	0.297	-4.4	14.4	4.9	0.171	-2.1	12.0									***0.53***	***0.038***	***0.03***	***1.04***				
Tertiary	**14.6**	**0.005**	**4.4**	**24.8**	**11.2**	**0.005**	**3.4**	**18.9**									**1.03**	**2E-04**	**0.48**	**1.57**				
Marital Status: Reference=Married																								
Single	0.9	0.746	-4.5	6.3	***4.8***	***0.022***	***0.7***	***8.9***					**6.9**	**0.003**	**2.3**	**11.6**								
Living as Married	***17.0***	***0.010***	***4.0***	***29.9***	**14.3**	**0.006**	**4.1**	**24.4**					**15.9**	**0.008**	**4.1**	**27.6**								
Separated	-5.6	0.313	-16.5	5.3	-5.5	0.209	-14.0	3.1					0.4	0.943	-9.7	10.5								
Divorced	-2.5	0.629	-12.7	7.7	-0.7	0.855	-8.7	7.2					3.3	0.488	-6.0	12.6								
Widowed	-8.0	0.0534	-16.1	0.1	-2.5	0.399	-8.3	3.3					-1.2	0.725	-7.9	5.5								
Ill: Reference category=not ill																								
Age (years)																	**-0.068**	**0.002**	**-0.111**	**-0.025**	**-0.017**	**2E-05**	**-0.025**	**-0.009**
Age^2	***-0.0027***	***0.012***	***-0.0049***	***-0.0006***													**0.001**	**0.001**	**0.000**	**0.001**				
R^2		0.196				0.150				0.018				0.049				0.088				0.057		
c) Variables added to multivariate restricted models[b]																								
q1 (overall QoL, per 1 on 1-5 scale)	**3.6**	**0.001**	**1.4**	**5.8**	**7.7**	**0**	**6.2**	**9.2**	**6.2**	**1E-08**	**4.1**	**8.3**	**11.1**	**0**	**9.5**	**12.7**					**0.4**	**0**	**0.3**	**0.5**
q2 (overall health, per 1 on 1-5 scale)	**4.0**	**5E-04**	**1.8**	**6.2**	0.3	0.660	-1.2	1.9	1.4	0.190	-0.7	3.5	-0.7	0.409	-2.3	0.9	**0.43**	**0**	**0.33**	**0.53**				
q26 (Depression, per 1 on 1-5 scale)	**6.1**	**9E-08**	**3.9**	**8.3**	**9.6**	**0**	**8.2**	**11.1**	as univariate above				**9.8**	**0**	**7.9**	**11.5**	**0.45**	**0**	**0.34**	**0.56**	**0.24**	**5E-05**	**0.12**	**0.35**
Disability weight of illness (0-1 scale)	***-17.5***	***0.026***	***-33.0***	***-2.1***	4.4	0.479	-7.8	16.6	as univariate above				9.4	0.142	-3.2	22.1	0.26	0.513	-0.51	1.02	-0.56	0.134	-1.30	0.17

p<0.05 **p<0.01** **p<0.001** E=exponent (base 10) e.g. 2E-06 = 2 x 10^{-6}

[a] Restricted model after starting with all socio-demographic variables and removing those p>0.1 signficant

[b] q1 and q2 added together; other coefficients not shown (but generally not qualitatively different from section b above after section c variables added)

Depression (q26) was found to be significantly associated with all six domains (Physical, Psychological, Social and Environmental domains scores (0-100 scales) were between 8.0 and 10.5 points higher per 1 increase on the 1-5 scale of: never depressed (1), seldom depressed (2), quite often depressed (3), very often depressed (4) and always depressed (5); and 0.47 and 0.27 points higher on overall QoL and health domains respectively per 1 increase on the 1-5 scale-univariate regressions in Table 3.6a; similar for multivariate regressions in Table 3.6c).

Respondents with current health conditions with higher (worse) disability weights were found to have significantly lower Physical domain scores (-2.33 on the 0-100 scale per 0.1 increase in disability; 95%CI: -3.94, -0.71; p=0.005) and overall health domain scores (-0.08 on the 1-5 scale per 0.1 increase in disability; 95%CI: -0.15, -0.00; p=0.042; Table 3.6a univariate regressions; slightly lower decreases for multivariate analyses: Table 3.6c) only.

3.3 Discussion

This study has examined the psychometric properties of a newly-translated Chichewa version of the WHOQoL-BREF among healthy adults, and adults with a range of different health conditions, from the general population of Malawi. It provides information on the acceptability, comprehensibility and validity of the Chichewa WHOQoL-BREF.

3.3.1 Acceptability and Comprehensibility

The high response rate of 97% and the fact that nearly all-300 respondents answered all questions except q21 on sexual activity, indicates high general acceptability and comprehensibility of the questionnaire. As with other studies (e.g. Nedjat et al., 2008), q21 was often refused, in this case by 36% of respondents, due to its sensitive nature. Comments by those who refused q21 included: "*Question 21 is a taboo*" and "*Question 21 ought to be selective depending on somebody's age*".

Regarding comprehensibility, there were only a handful of comments by those who did not understand specific questions: "*Questions 17* [activities of daily living] *and 18* [work capacity] *are difficult to understand*"; regarding question 12 [financial security]: "*There is no way a person can be satisfied with money. The question might as well be dropped*"; "*On question 3* [physical pain] *it depends on the severity of the sickness*"; regarding question 26: "*consider splitting... ...some may be unhappy but optimistic. One answer cannot stand for all those feelings*"; and, "*I wonder whether some questions relate to good quality of life, for instance question 21*". Respondents were invited to provide these comments at the end of the questionnaire.

3.3.2 Validity

The internal consistency and structure of the four multi-faceted domains of the Chichewa WHOQoL-BREF was validated by analyses showing that each item was most correlated to the domain assigned to it by the original authors of the WHOQoL-BREF.

Evidence for the ability of the Chichewa WHOQoL-BREF to discriminate between known groups was also found. All four domain scores differed significantly and by large amounts in

the expected direction depending on how depressed the respondent was, the disability weight of their current health condition, and their overall quality of life. The findings regarding disability weights also fulfil the main WHO-mandated goal of this pilot study (WHO, 1998) by illustrating the discriminative nature of the Chichewa version of the WHOQoL-BREF with regard to determining the effect of different states of health (often the target of a specific intervention being evaluated) on quality of life. As expected, respondents with health states with higher disability weights were found to have lower physical quality of life scores.

The association between low quality of life and high disability weights, also provides evidence of convergent validity in that the WHOQoL-BREF scores were associated with the scores, given by people in similar health states, that were originally used to construct the disability weights (Murray and Lopez, 1996). To my knowledge, alternative instruments for assessing quality of life such as the EQ-5D, or the SF-36, which is commonly used for comparison with the WHOQoL-BREF (Nedjat et al., 2008; Bonomi et al., 2000), are not available in Malawi.

Work led by Giulia Greco, using a newly-developed questionnaire to assess quality of life from the perspective of the capabilities approach to human wellbeing, is currently in progress in Malawi; such work will involve comparing the results of the Chichewa WHOQoL-BREF questionnaire to the capabilities approach questionnaire, using the same respondents for the purposes of assessing convergent validity of both questionnaires. It is hoped this work will provide evidence to test my hypotheses concerning the overlap of areas of quality of life captured by the WHOQoL-BREF and those encapsulated by the capabilities approach, detailed in §2.3.1 (especially see Table 2.1 on page 51).

3.3.3 Reliability

Test-retest reliability was not examined in this study. Despite the fact that others have assessed this (e.g. Nedjat et al., 2008), we considered that running the survey as a patient interview precluded test-retest reliability assessment, as being out of hospital, even one day after the initial interview, might change the results obtained.

3.3.4 Other findings

Analysis of how the domain scores varied depending on socio-demographic characteristics yielded some interesting results. Older respondents were found to have lower Physical and Psychological quality of life – although when controlling for gender, education and marital status, older age was only associated with lower Physical domain scores. A higher level of educational attainment was found to be associated with higher quality of life in all domains except for Social Relationships and these relationships (except for that with Environment domain scores), held constant after controlling for the other socio-demographic variables. Respondents living as married or single were found to have higher quality of life in the Physical, Psychological and Social domains, and those who were widowed lower Physical quality of life.

The positive relationships between education (especially tertiary) and domain scores (physical, psychological and overall, after controlling for other significant variables), are also interesting. It's possible that these relationships are mediated by better education leading to higher

earnings, which lead to better health and quality of life. Recent studies in poor rural communities in older adults also show lower self-reported health and quality of life in those with lower education and lower socio-economic status (Ng et al., 2010a; Gomez-Olive et al., 2010; Van Minh et al., 2010; Razzaque et al., 2010; Ng et al., 2010b). In this study it is uncertain how self-reported quality of life differed in comparison to actual quality of life (although possibilities are discussed below), and whether this is dependent on education or other variables.

It is also interesting to note that the correlation between age and education is highly statistically significant ($p=1.4 \times 10^{-12}$) and negative (Pearson's correlation = -0.4; data not shown), meaning that older respondents had attained a lower level of education, as may perhaps be expected, given recent advances in access to education in Malawi.

3.3.5 Limitations

There was some overlap between the sample categories in the sense that: all 26 healthy people interviewed in KCH were guardians of patients, and, as such, may have been affected by the sickness of their friends/relatives; eight of the 259 'sick' respondents were caring for sick children rather than being sick themselves, although they perceived themselves to be ill; and, six respondents who answered '*No*' to the initial '*Are you currently ill?*' question still defined themselves as having specific (perhaps asymptomatic) health problems, when asked responding to the next question (Appendix H). These anomalies are unlikely to have affected the results significantly.

Disability weights were not available for all health conditions specified by respondents; and some of the conditions were difficult to match with those listed, due to insufficient information provided by the respondent. Future studies would benefit from collecting more information to better match the respondents' conditions to those on the global burden of disease list.

The multivariate disability weight and depression analyses were done by adding the variable in question to the already-arrived-at restricted socio-demographic model i.e. they assume that a positive value of the added variable in question does not predate the socio-demographic variables. Whilst this should be valid in most cases, it is invalid for cases, which remain unknown, where the disability/depression has been very long-term and pre-dates education and marital status, for example. In this case the disability/depression variables should be added to the regression at the beginning with the other variables.

Despite the validity checks, it's possible that there is a bias in the answer to some questions and particularly those of the Psychological domain (which has a higher mean score and is skewed towards 100) due to anecdotal evidence of an 'it is well with my soul' syndrome in Malawians. It is hypothesised that for all questions that are direct to an individual's well being, a Malawian will prefer to respond that they are okay, when they are not okay. In Malawi, as in other countries, the usual greeting is '*muli bwanji*? (how are you?) and the responses are always '*ndili bwino khaya inu*' (I'm fine, what about you?) even if they are sick, hungry, without money or frustrated. Anecdotal evidence suggests Malawians generally only say things are not alright after further questions. For questions concerning far-away issues (e.g. money, living places, transport – Environment domain) the scoring may be poorer as anecdotal evidence suggests Malawians are generally more honest with distant things than things within themselves. These

potential biases can't be ruled out by the quantitative validation methodology employed in this study.

Finally, because the survey was not conducted among a representative sample of the general population, it is not possible to conclude that the domain and facet scores from this sample reflect the quality of life of the general population of Malawi.

3.3.6 Conclusion

The pilot WHOQOoL-BREF study presented in this chapter provides evidence that the newly-translated Chichewa version of the WHOQoL-BREF is valid for future use within Malawi. It is hoped that subsequent evaluations of health states, health interventions and wider interventions in the public sphere will benefit from its use.

Chapter 4

Do women's groups improve quality of life?

In chapter 1 the scope of the potential benefits of the women's groups was discussed with the conclusion that there could be many benefits to quality of life beyond those of the groups' primary aims of mortality reduction. Such benefits could include improved health and access to healthcare, but also non-health benefits such as improved social relationships and support, transport availability, finances, self-esteem and access to information. The concept of quality of life (§ 2.1 on page 30) encapsulates all such areas of life. It is therefore useful to measure for the purpose of measuring the benefits of the women's groups beyond mortality reduction and specific health benefits.

Following its translation and validation for use in Malawi (§3), the Chichewa WHOQoL-BREF (Appendix F) was used for the first time to measure quality of life in a rural Malawian context in this study. The WHOQoL-BREF has been previously used to measure quality of life in a diverse variety of other settings. These include: psychiatric patients in Sudan (Awadalla et al., 2005); HIV positive and depressed people in Nigeria (Adewuya et al., 2008); displaced people in post-conflict Ethiopia (Araya et al., 2011); Parkinson's patients in Brazil (Hirayama et al., 2007); postnatal women in Australia (Webster et al., 2010); and opium-addicted patients with coronary artery disease in Iran (Najafi et al., 2009).

This study aims to assess whether MaiKhanda women's groups contribute to increased quality of life for their members and also other women in the same village.

4.1 Methods

This study was nested within a cluster randomised controlled trial (RCT) testing the effect of community women's groups and health facility quality improvement on maternal, perinatal and neonatal mortality (Colbourn et al., 2012b). We conducted a cross-sectional survey on quality of life using the Chichewa WHOQoL-BREF (Appendix F) in rural areas of Kasungu, Lilongwe

and Salima districts in the central region of Malawi, between January and June 2011.[1]

4.1.1 Objectives

The primary objective of this study was to explore differences in quality of life between MaiKhanda women's group members (wg), non-members in the same village (non) and women in control villages (control). Specifically, differences in physical (phys), psychological (psych), social relationships (social), environment (envir), overall quality of life (q1) and overall health (q2) domains of the Chichewa WHOQoL-BREF and the 27 individual facets (questions, q) were explored and tested for statistical significance. Any observed differences between the 3 groups (wg, non and control) were then investigated. As well as controlling for the influence of socio-demographic variables, I investigated whether differences were more likely to have been caused by the women's groups or to be endogenous to women's groups given their membership was self-selecting.

A secondary objective, made possible by the nature of the quality of life data collected in this study, was to investigate the responses of the whole sample in order to uncover any evidence of specific areas of quality of life (as defined by the WHOQoL-BREF) being either 'fertile functionings' or 'corrosive disadvantages' (Wolff and De-Shalit, 2007) (see §2.1.5 and §2.2.4). That is, in the case of 'fertile functionings', evidence that high levels of specific WHOQoL-BREF facets were associated with high levels of other facets; and in the case of 'corrosive disadvantages', evidence that low levels of specific facets were associated with low levels of other facets. Readers are referred to Table 2.1 on page 51, which details how the WHOQoL-BREF quality of life facets are akin to capabilities - high or low levels of each perhaps respectively being the 'fertile functionings' and 'corrosive disadvantages' this investigation hopes to uncover.

4.1.2 The sample

By stratifying the respondents to the WHOQoL-BREF into those attending women's groups; those in communities with WG who did not attend any groups; and those in communities without WG, the effect of the WG intervention on women's general QoL could be determined. A total of 540 women were surveyed; 180 in each of three groups: women's group members, women in the same village who are not members of the women's group and women in control arm (of the RCT (Colbourn et al., 2012b) villages (Figure 4.1). Each arm of 180 women comprised 5 women in each of 36 villages, with the same villages being used for the members' and non-members' arms.

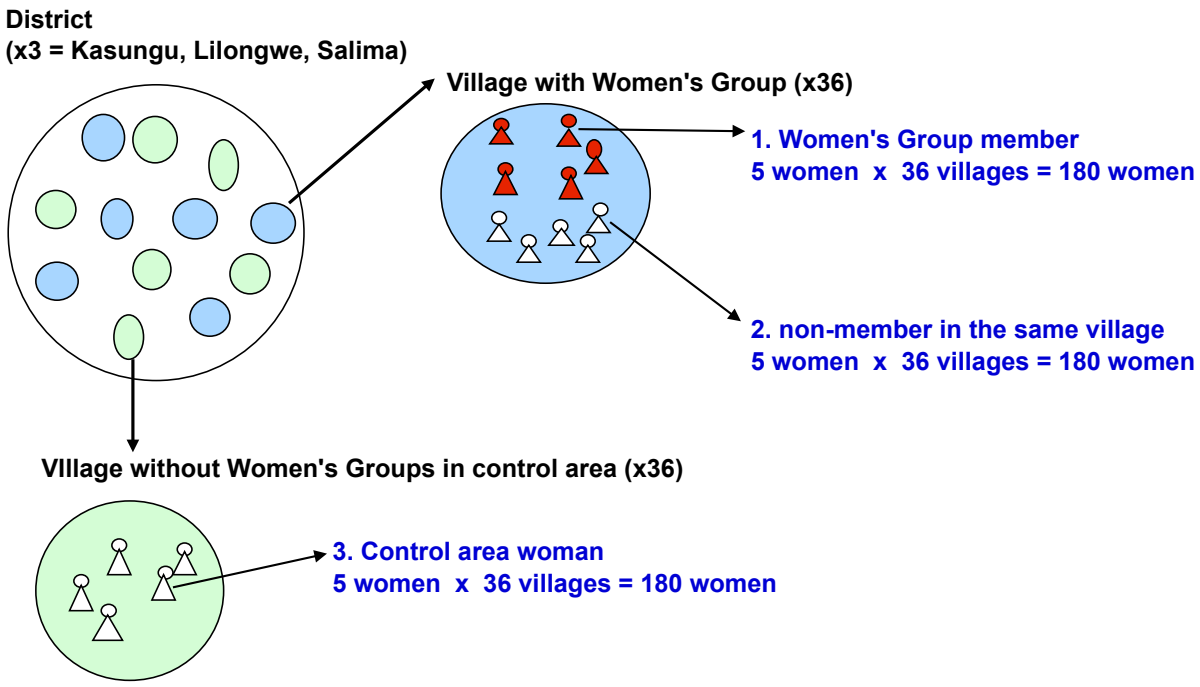
4.1.2.1 Sample size and precision[2]

The 5 x 36 x 3 sample size was chosen at as it yields an 80% power to detect differences of 0.5, on a scale of 1-5, at the 95% level of statistical significance, in untransformed mean quality of

[1] Due to time and money constraints, the survey was only carried out once (between January and June 2011). The sample therefore constitutes an ad hoc cross-section. The implications of this for attribution of causation are discussed later.

[2] I thank Dr. Christina Pagel for her assistance with these sample size calculations; however, this section and any errors it may contain are my own.

Figure 4.1: Sample for WHOQoL-BREF Survey



life scores in each of the six domains of the WHOQoL-BREF, taking into consideration both village-level clustering and multiple hypothesis testing (differences in each of the six domains between each of the three combinations of the three groups: 18 comparisons in total). The 3 comparison arms and the 36 villages (clusters) per arm were already decided in order to test hypotheses and ensure adequate geographic coverage, respectively (see above). The formula used for the number of women required in each of the clusters, n, was adapted from equation 6 of Hayes and Bennett (1999) and is:

$$n = \frac{(z_\alpha + z_\beta)^2(s_1^2 + s_0^2)}{c(\mu_1 - \mu_0)^2 - (\mu_1 - \mu_0)^2 - (z_\alpha + z_\beta)^2 k^2(\mu_1^2 + \mu_0^2)} \tag{4.1}$$

where:

z_α corresponds to the tail of the standardised cumulative normal distribution with mean 0 and standard deviation 1 representing the probability of rejecting the null hypothesis when it is true (probability of committing a Type I error); α is the p-value below which we would accept the result as statistically significant and is usually set at 5% in social science and health research. Here we set it at $5\%/(6 * 3 * 2) = 0.0013\dot{8}$ to adjust for multiple hypothesis testing: testing differences in each of the 6 domain scores, between each of the 3 combinations of two of the three arms (wg vs. non; wg vs. control; and non vs. control, see §4.1.1), each as 2-tailed comparisons i.e. allowing the possibility of either arm having a higher score.

z_β corresponds to the tail of the standardised cumulative normal distribution with mean 0 and standard deviation 1 representing the probability, β, of accepting the experimental hypothesis when it is true. β is the power of the study, and can also be thought of as the probability of

observing the difference in the sample if it really exists in the population the sample represents, and is set at 80% here, as is usually acceptable in social science and health research ($1 - \beta$ is the probability of committing a Type II error, rejecting the experimental hypothesis when it is true).

s_1 and s_0 are the standard deviations of the domain scores of the two comparison groups (either wg and non; wg and control; or, non and control, see §4.1.1) and are each assumed to be 0.82 here, the average standard deviation of all six domain scores from each of the three groups in the pilot study (§3), the only pre-existing Chichewa WHOQoL-BREF data.

μ_0 and μ_1 are the mean domain scores of the two comparison groups (either wg and non; wg and. control; or, non and control, see §4.1.1) and are each assumed to be 3.5 and 4.0 here, the average of all six domain scores from each of the three groups in the pilot study (§3), and a potential 0.5 difference between study arms.

c is the number of clusters per comparison arm, set at 36 here (see Figure 4.1)

k is the coefficient of variation of the domain scores, set at 0.11, that observed from splitting the pilot sample of 309 (§3) into 36 clusters based on values for gender, education, marital status and illness. k was calculated for each domain score of the pilot sample as the mean of the mean domain scores for each cluster divided by the standard deviation of the mean domain scores for each cluster; 0.11 being the average k of the six for each of the domains (range 0.08-0.17).

Plugging these numbers in yields an answer of:

$$\frac{(2.9913 + 0.8416)^2(0.82 + 0.82)}{36(4.0 - 3.5)^2 - (4.0 - 3.5)^2 - (2.9913 + 0.8416)^2 * 0.11^2 * (4^2 + 3.5^2)} = 5.3$$

5.3 women per cluster. I chose to interview 5 women per cluster yielding a 79% power to detect differences of 0.5 on the untransformed 1-5 quality of life domain score scales. Assuming the more lenient corrections for multiple hypothesis testing used in the analysis (Benjamini and Hochberg, 1995) (see §4.1.4.1), or others suggested in §4.3.1, increases the power of the study. Note that instead of allowing for non-responders in the sample size calculation, in the few cases of a woman refusing or being unavailable to take part in the study another women was approached so that 5 women were always sampled per arm per village. Equation 4.2 can also be used to determine the power the best-worst scaling and contingent valuation studies had to answer the questions related to their hypotheses. Although, such post-hoc calculation becomes unnecessary as the actual power achieved is reflected by the width of the confidence intervals surrounding the statistical estimates calculated from the final observed data (i.e. the final observed μ_0 , μ_1, s_1 , s_0 and k).

4.1.2.2 Random selection

Both the villages, and the women within the villages, were randomly selected to ensure the findings of the quality of life study were as generalisable as possible to the whole rural populations of Kasungu, Lilongwe and Salima districts.

The villages containing women's groups and the control area villages were each selected from separate lists from the MaiKhanda women's group and community surveillance databases,

respectively, using the random number generator in Microsoft Excel after copying the lists from the Microsoft Access databases. The women's group villages were selected in proportion to their geographic coverage, with 4 villages randomly selected from the 81 covered by each supervisor resulting in a total of 16 villages surveyed from the 324 villages containing groups set up in Lilongwe; 12 surveyed from the 243 villages containing groups set up in Kasungu; and 8 surveyed from the 162 in Salima. The same number of control villages were also randomly selected and surveyed in each district. Originally, women's group and control villages were to be approximately matched on distances to the nearest main road and trading centre and on population size. However, such data was not always available and, when available, not always accurate, so villages were not matched this way. I assume, however, that given the relatively homogenous geography within the rural areas of each of the three districts, the random selection procedure stratified by district resulted in each of the women's group and control area village samples being sufficiently similar.

Within each women's group village the 5 women's group members were randomly selected for interview from all of the women listed in the women's group register, either using the database if the register data had been entered into it (in this case after copying the data into Excel the names were each assigned numbers and 10 were selected using the random number generator, 5 being reserves in the case of refusal), or, in the absence of electronic register data, from the paper register held by the women's group facilitator (in this case by numbering the women on the register and using a random number list printed from Excel). Within each women's group village the 5 non-members were randomly selected for interview using a random walk procedure whereby the interviewer spun a bottle and started walking in the direction the bottle pointed and went to every third household (given an average village size of approximately 50 households, this should have ensured an even distribution of interviewees) and asked to interview the woman in the household who had most recently had her birthday; repeating this until 5 women were interviewed. The same random walk procedure was followed in the control villages.

Appendix I on page 328 summarises the random sampling procedure and also contains maps generated by the GPS coordinates of the villages for Salima and Kasungu[3], but does not contain the names of the villages, women's groups or the respondents randomly selected, to ensure confidentiality. Appendix J then details the budget for the whole study in two parts, followed by detailed budgeting for the main survey fieldwork in each of the three districts.

4.1.3 The survey

The previously-validated Chichewa WHOQoL-BREF (§3) was used to measure quality of life. WHO guidelines were followed in the conduct of the WHOQoL-BREF survey (WHO, 1998). The interviewer first explained the survey and its purpose and the questionnaire was completed by interview to assist illiterate respondents. The WHOQoL-BREF questionnaire was followed by the best-worst scaling experiments for each respondent (see §6) and then, for one in five respondents, questions asking how important each of the WHOQoL-BREF questions are (see

[3]GPS-coordinates were not collected for Lilongwe as the GPS machines were not available for my study until after the Lilongwe data collection was completed

§6), and for a different one in five respondents, the Contingent Valuation questionnaire (see §7). The questionnaire took an average of 9 minutes to complete with interviewers typically each interviewing five respondents (in the same village) per day. Due to extenuating circumstances[4] a total of 5 interviewers were used throughout the study period, two at a time.

To improve the accuracy of data collection and to eliminate the need for separate data entry systems, all questionnaires were programmed into a portable computer (PDA) using Pendragon Forms 5.1 software, which works within Microsoft Access (see Appendix K on page 340). Computerisation of data collection also helped the interviewers avoid inconsistencies in question flow (via the use of skip rules) and avoided the recording of illegal answers (via the use of validation rules e.g. latest date of birth being at least 18 years before the date of data collection).

4.1.4 Quantitative analysis methods

All statistical analyses were conducted using Stata 12.1 for Mac (StataCorp, 2011a), see Appendix V for the Stata .do-file code.

4.1.4.1 Investigating differences in quality of life

The results of each questionnaire were scored using the procedure detailed in the WHO user manual which involves the physical, psychological, social relationships and environment domain scores being converted to a 0-100 score and the overall quality of life (q1) and overall health (q2) domains being left on the original 1-5 scale (WHO, 1998, p.100), see §3.1.3. The respondent's score for each domain is dependent on the scores he/she gave for each facet (question) within it. Facet scores can first be weighted according to the importance (on a scale of 1 to 5) that a representative group of respondents gives each question (see §6.5.4). An alternative, more advanced weighting procedure, involving discrete choice experiments that encourage respondents to trade-off the importance of each facet against others (i.e. more than one facet can't be given the same level of importance), is explored later (see §6). In this chapter I focus on the unweighted (i.e. equal weighting assumed) quality of life scores from the WHOQoL-BREF.

Mean domain and facet scores for each group of respondents were used, along with their distributions, to explore differences in quality of life between the three groups. The significance of the observed differences was determined first by t-tests and then by step-wise ordinary least-squares (OLS) regressions using the socio-demographic information collected on the questionnaire (age, education, martial status, illness; see Appendix E on page 305) to aid the assessment of whether and how such respondent characteristics also affect quality of life. Interviewer effects were then assessed by the addition of a dummy variable representing each of the five interviewers. As well as the differences in quality of life domain and facet scores between the three study arms, the differences between the women's group members and non-members in the same village combined, and the control area women (who were in different villages), were examined. In addition, differences between women's group members and non-members in the same village were

[4] one interviewer left to pursue a university degree and two were sacked after they were caught having faked the data they 'collected' when they were away in Kasungu district for a month. The latter necessitated Kasungu having to be re-surveyed, with two new interviewers (and paid for using my own money as the grant money taken by the two sacked interviewers to pay for 'field costs' could not be recouped).

examined, in models that excluded the control area women. Models including random effects by village (cluster - see §4.1.2) were also assessed. P-values were adjusted using a false discovery rate correction procedure outlined by Benjamini and Hochberg (1995), which sequentially adjusts p-values to account for multiple hypothesis testing[5] whilst maintaining power. Given the domain scores are the main measures of the WHOQoL-BREF and the facet scores, subsidiary to them, the significance of the p-values of the tests of the domain scores were adjusted as a separate batch to those of the facet scores.

The specification of the regression models is as follows:

$$\mathbf{y}_{ij} = \alpha_{ij} + \beta x_{ij} + \gamma \mathbf{z}_{ij} + \zeta w_{ij} + \epsilon_{ij} \tag{4.2}$$

where $\mathbf{y}_{ij}$ is a vector representing the six quality of life domain scores (Y, see below) or 27 quality of life facets (not shown) for individual i in village j (these subscripts also have the same meaning for each of the independent variables, described below. Note that j is only included in the models specifying random effects by village (cluster), which were found to be very similar to the simpler models not including j). Each Y was estimated in a separate multivariate regression, and given estimation by OLS linear regression, is expected to be normally distributed.[6]

$$\mathbf{y} = \begin{bmatrix} Y_{phys} \\ Y_{psych} \\ Y_{social} \\ Y_{envir} \\ Y_{overall} \\ Y_{health} \end{bmatrix}$$

α is the constant term, representing the domain score at the base levels of all of the independent variables included in the regression,

x represents the study arms, and, for each individual i, can take one of the following three values for the comparisons of the three study arms:

$$x = \begin{bmatrix} x_{wg} & x_{non} & x_{control} \end{bmatrix}$$

or one of the following two values for the comparison of the control group with the combin-

[5] this is necessary to correct for the fact that, by definition, 1 in 20 results that are significant at the 5% level are likely to have occurred due to chance only.

[6] although the distributions of Y_{phys} , Y_{psych} , Y_{social}, and Y_{health}, and most of the 27 facets, are skewed towards higher values in the dataset (negatively skewed; data not shown), OLS regression is sufficiently robust to such modest departures from normality to avoid the transformation of these variables. Avoiding transformation is useful for the sake of clarity in interpretation of the results. Given that the domain scores are obtained from discrete data (1-5 scales on the WHOQoL-BREF, see §3.1.3) the raw scores could instead be used as count data in Poisson regressions, providing that the facet scores making up each multi-faceted domain are summed rather than averaged. However, such exploratory analyses and the necessary investigations of how they relate to the OLS regressions on the transformed linear-continuous-data domain scores, calculated correctly using averages of facet scores (§3.1.3), are beyond the scope of the current study. This is primarily due to the lack of resolution of the more pressing problem of endogeneity (see below).

ation of women's group members and non-members in the same village (the same j):

$$x = \left[\begin{array}{cc} x_{wg+non} & x_{control} \end{array} \right]$$

or one of the following two values for the comparison of women's group members with women in the same village:

$$x = \left[\begin{array}{cc} x_{wg} & x_{non} \end{array} \right]$$

For the results shown below in this chapter, either the quality of life domain scores of the women's group members and non-members (x_{wg} and x_{non}) were each separately estimated relative to those of control members ($x_{control}$, which was excluded as the reference category of the dummy coded variable representing study arm); or the quality of life domain and facet scores of the women's group members and non-members in the same village combined ($x_{wg+control}$) were estimated relative to those of the control members; or the quality of life scores of the women's group members were estimated relative to non-members in the same village (in models that did not include the control area women). The β coefficient(s) represent(s) the difference in the quality of life domain or facet score (specific Y) of the study arm(s) in question (x_{wg} and x_{non}, or $x_{wg+control}$, coded as 1 meaning that its β coefficient is included in the model, i.e. $\beta x = \beta * 1 = \beta$), relative to the base study arm (in this case $x_{control}$, coded as 0 meaning that its β coefficient is not included in the model, i.e. $\beta x = \beta * 0 = 0$).

$\mathbf{z}$ is a vector of respondent socio-demographic characteristics:

$$\mathbf{z} = \left[\begin{array}{c} z_{marital} \\ z_{edu} \\ z_{illness} \\ z_{age} \end{array} \right]$$

The first three of these are dummy coded and for each individual i can each take one of the following values:

$$z_{marital} = \left[\begin{array}{ccccccc} z_{single} & z_{married} = 0 & z_{livingasmarried} & z_{separtaed} & z_{divorced} & z_{widowed} \end{array} \right]$$

$$z_{edu} = \left[\begin{array}{ccccc} z_{none} = 0 & z_{primary} & z_{secondary} & z_{tertiary} & z_{noanswer} \end{array} \right]$$

$$z_{ill} = \left[\begin{array}{cc} z_{notill} = 0 & z_{ill} \end{array} \right]$$

The reference categories for each of these 3 variables, which were dummy coded, are represented by '= 0', with the remaining categories coded as 1, i.e. included in the model when they apply to individual i.

Those z whose coefficient, γ, were significant after backwards step-wise regression (see above) were retained in the model. The γ coefficients represent the change in quality of life domain score (specific Y) of the socio-demographic variable category z relative to the reference category (omitted from the model given dummy coding) for each specific socio-demographic variable.[7] age, and it's quadratic transformation, age^2 are continuous z variables also tested in the models, whose γ coefficients represent the change in Y per unit of age or age-squared, meaning that, for example in the case of age: the dot product of individual is age in years and the γ for age is the predicted value of Y for that individual, i.e. if individual i was 34: $Y_i = z_{age}\gamma = 34 * \gamma$.[8]

w represents the interviewer and can take one of the following five values depending on which interviewer interviewed the respondent. It is also dummy coded so that the ζ coefficient represents the distribution of the change in quality of life domain score (specific Y) of this interviewer (coded as 1) relative to interviewer 1, who as the interviewer with the most experience was chosen to be the base category (coded as 0):

$$w \quad = \quad \left[\begin{array}{ccccc} w_1 = 0 & w_2 & w_3 & w_4 & w_5 \end{array} \right]$$

Finally, ϵ, the error term represents all of the unexplained variation in $\mathbf{y}$, including that due to unmeasured variables omitted from the model and due to measurement error of the variables included in the model. OLS regression assumes that the errors have a mean of zero and that the independent variable regressors are uncorrelated with the errors.

It is possible that women with a better quality of life are more likely to initially join the women's groups and, therefore, that quality of life is endogenous to the impact of women's groups on quality of life, i.e. that, using the above notation, βx_{wg} is correlated with an unknown omitted variable, or variables, within ϵ, therefore violating the strict exogeneity assumption of OLS. If this study was able to collect data on the same women at two time points, one before and one after the women's group intervention started (i.e. before and after the women's group members became members), then a 'difference in difference'[9] analysis could have either confirmed or refuted any endogeneity. With the existing cross-sectional data, endogeneity was tested for in two separate ways. Firstly, by estimating a regression model to predict the quality of life domain in question using women's group membership or study arm, and the other independent variables, as detailed above, then saving the residuals (unexplained variance) and testing how significantly different from zero they are as independent variables in a model that has women's group membership (or study arm) as the dependent variable and the quality of life domain score,

[7] Therefore for each individual (i), $\mathbf{g}$ is a vector of γ coefficients, defined by $\mathbf{z}$, the vector of z dummy variable categories pertaining to her. However, when considering the model averaged over all individuals (i) and all villages (j), $\mathbf{g}$ becomes the matrix $\mathbf{G}$, defined by $\mathbf{Z}$ which is a matrix made up of vector $\mathbf{z}$ expanded to so that each row has a number of columns equal to the different dummy coded categories of each z variable detailed above.

[8] Note that this is the same calculation for the 0 and 1 dummy coded variables.

[9] examining the differences between the difference between the two time points in each group

the residuals from the original model and all other variables significantly associated with women's group membership (education, marital status and interviewer) as independent variables. Secondly, by conducting a Hausman test comparing the two models just described, to test if differences in the values of the coefficients they share between them are systematic. These tests indicated that all of the WHOQoL-BREF quality of life domain scores, except perhaps that of the social domain (Hausman $\chi^2(12df) = 19.57$; $p = 0.0758$, where the null hypothesis is that the variables are exogenous), were endogenous to women's group membership. Further tests were also carried out on each of the 27 facets, which provided evidence that all facets except for *q7 concentration*, *q11 appearance*, *q22 support*, *q8 security*, *q9 environment healthy* and *q13 information*, were likely to be endogenous.

In cross-sectional studies such as this one, the problem of endogeneity is usually tackled using instrumental variable regression, a form of regression analysis involving the use of an 'instrument', a variable that is required to be both correlated with the endogenous explanatory variable, in this case membership of the women's group ($x_{wg} = 1$), but also uncorrelated with ϵ (Kleibergen and Zivot, 2003). None of the variables collected for this study, or from the same respondents in the other studies of this Ph.D., were suitable as instruments. Therefore, it was not possible to correct for the possibility of endogeneity in the models aimed at estimating the effect of women's groups on the WHOQoL-BREF quality of life domains.

For all of the regressions multicollinearity was tested for via the calculation of Tolerance statistics. In all cases, including those where interviewer effects were identified (cases where ζ coefficients were statistically significant when β coefficients were also estimated), multicollinearity was not found to be a problem: Tolerance statistics were always above 0.78 on a scale of 0 to 1 (and usually much higher; data not shown), where values less than 0.1 are typically taken to indicate a level of multicollinearity that is likely to affect the accuracy of the dependent variable estimation (Hill and Adkins, 2001).

4.1.4.2 Investigating fertile functionings

The investigation of 'fertile functionings' and 'corrosive disadvantages' (Wolff and De-Shalit, 2007) was done in three main steps.

Firstly, regressing each WHOQoL-BREF quality of life facet against all of the others in separate univariate regressions and quantifying how many of the others were significantly associated with it (looking at the magnitude of the t statistics to compare the significance of each), and in what direction and how extreme the correlations were and the magnitude of the R^2 values (how much of the variation in each quality of life facet was explained by changes in each of the other quality of life facets). This analysis was also conducted on the pilot sample (n=309) and on the combined main sample and pilot sample (n=843) in order to examine potential differences between the more urban and male-including pilot study sample and the rural and female-only main sample.

Secondly, for each of the 27 facets, estimating backward stepwise multivariate regressions: starting with all of the socio-demographic variables, the variable identifying the interviewer, and all of the other quality of life facet scores and finishing with a restricted model only containing

independent variables significant at the $p<0.05$ level. Each of these 27 regression analyses identify how much each facet score (the dependent variable) changes in relation to changes in the other facet scores, controlling for any socio-demographic variable or interviewer effects (all initially included as independent variables before the stepwise elimination). Looking at the results of all 27 multivariate regression analyses together, the facets that are associated with the most other facets, i.e. in higher numbers of these multivariate regressions as significant independent variables, are most likely to be 'fertile functionings' (or corrosive disadvantages[10]). Differences between multivariate analyses for the pilot study and main study samples were not explored, although will be the subject of further investigations beyond the scope of this thesis, along with including in each of the multivariate models a term representing the study, to see average differences between the different study populations.

Thirdly, the results of the multivariate analyses for the main study sample, the focus of this chapter, were examined together in a large structural equation model (SEM) linking the relationships between the facets as both dependent variables and independent variables, in each of the 27 models, together. The relationships that remained significant in this model could denote fertile functionings (or corrosive disadvantages). However further work is required in this area, especially given that the limitations of the data largely precluded more in-depth analyses.

For each of these three analyses the results were summarised for each of the 27 WHOQoL-BREF facets by taking the sum of the values of the significant coefficients denoting their influence as an independent variable; the idea being that such a measure takes account of both the magnitude of the increase of the other quality of life facets dependent on an increase of 1 on the 1 to 5 scale of the facet in question, and also the direction of the association i.e. negative associations (decreases) cancel out positive associations in the sum. These sums of significant coefficients were then used to rank all 27 coefficients separately depending on the results of each of the three analyses. Kendall's rank correlation coefficients for each of the three pairwise comparisons between the rankings for the univariate, multivariate and SEM were then calculated to test whether the different measures were independent, i.e. whether the summary measures of the different analyses were different across the whole set of 27 quality of life facets. Where independence could be rejected, ranks could be pooled to give an indication of which facets were most influential on the others, i.e. most likely to be 'fertile functionings' or 'corrosive disadvantages'. Given their relative lack of information compared to the multivariate and SEM analyses, the univariate analyses were not used as part of any pooled ranking.

[10] Given that the scores for nearly all of the facets are skewed towards higher values on the 1-5 scale (data not shown for main study), and considering the relatively small sample size of the study (n=534), the investigation of 'fertile functionings' - facets that when at high levels (scores) are likely to lead to other facets also being at high levels - is favoured. 'Corrosive disadvantages' - facets that when at low levels (scores) are likely to lead to other facets being at low levels - would also be denoted by positive regression coefficients, which denote both scores moving in the same direction. Therefore, in this sense the regression coefficients are evidence for both 'fertile functioning's and 'corrosive disadvantages'. Given the skew of the data, such significant positive regression coefficients are more likely to denote the former though. Further investigation of differences in correlations and regression coefficients at different ends of the facet score scales, with larger samples, would help in distinguishing between 'fertile functionings' and 'corrosive disadvantages'. Importantly, it would also allow investigation of whether the assumptions of the linear regressions - a uniform increase in facet score for each increase of 1 on the 1-5 scale of the other facet(s) - holds, or whether alternative non-linear relationships are more likely.

The results of these analyses can be found in §4.2.5 (and Appendix O). The limitations of these analyses are discussed, along with the results, in §4.3.2.

4.1.5 Focus Group Discussions

The quantitative results were validated by comparing and contrasting them with a thematic analysis of the information gathered in seven focus group discussions (FGD) with women's group members. See last paragraph of §3.1.1 for details of the FGD and also Appendix L on page 358 for FGD protocol and topic guide. The focus group discussions were carried out to understand the MaiKhanda woman's groups from the perspective of their members and to explore the opinions of the women regarding how the women's groups may affect different aspects of quality of life.

4.2 Results

4.2.1 Respondent characteristics

A total of 534 (99%) of the intended 540 respondents completed the interview (Table 4.1), no-one refused the interview, 6 were overlooked by the interviewers or otherwise did not have their data entered into the PDA or made available for analysis. 23% of the surveyed women had no education; more in the non-members arm had no education than those in either the WG member or control arms. More WG members had primary standard 1-4 education and more control village women had secondary education with non-members generally being less educated although the differences between the three groups were not large (Table 4.1). The vast majority of women in all three groups were married; most of the small 1% minority living as married were WG members; 2-3% of each arm were separated, 4%, 11% and 6% of WG members, non-members and controls, respectively, were divorced; and 9%, 6% and 2% respectively were widowed (Table 4.1). Only 1 woman was single, indicating, along with the marital status and education breakdowns, that the surveyed sample is not representative of the adult female population in Malawi (National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011) or that of the WHOQoL-BREF validation study (see §3). A higher proportion of the WG members and non-members indicated that they were currently ill than those in the control arm. The mean age was 35, with those in the control group slightly younger on average than those in the WG members or non-members study arms. The differences in socio-demographic characteristics between the three study arms are generally not striking, as would be expected given the randomisation.[11] The differences are, therefore, unlikely to greatly influence the quality of life results. In any case, they have been taken into account in the regression analyses.

Some interviewers interviewed more women from one arm than other arms (Table 4.1); the implications of this with respect to potential interviewer effects are discussed below.

[11] Random selection means that the null hypothesis of no differences between study arms is true and that it is therefore inappropriate to undertake statistical tests to determine whether the respondent characteristics of the study arms are statistically different to each other.

Table 4.1: Respondent Characteristics

	WG members (n=179)		non-members in same village (n=175)		control village women (n=181)		Total (n=534)	
	n	%	n	%	n	%	n	%
Education								
None	33	18.4%	52	29.7%	37	20.6%	122	22.8%
Primary Standard 1-4	70	39.1%	56	32.0%	62	34.4%	188	35.2%
Primary Standard 5-8	58	32.4%	57	32.6%	55	30.6%	170	31.8%
Secondary	16	8.9%	10	5.7%	26	14.4%	52	9.7%
No answer	2	1.1%	0	0.0%	1	0.6%	3	0.6%
Marital Status								
Single	0	0.0%	0	0.0%	1	0.6%	1	0.2%
Married	145	81.0%	140	80.0%	161	89.4%	446	83.5%
Living as Married	6	3.4%	1	0.6%	0	0.0%	7	1.3%
Separated	4	2.2%	5	2.9%	3	1.7%	12	2.2%
Divorced	8	4.5%	19	10.9%	11	6.1%	38	7.1%
Widowed	16	8.9%	10	5.7%	4	2.2%	30	5.6%
Interviewer								
1	80	44.7%	20	11.4%	90	50.0%	190	35.6%
2	20	11.2%	80	45.7%	90	50.0%	190	35.6%
3	56	31.3%	50	28.6%	0	0.0%	106	19.9%
4	16	8.9%	11	6.3%	0	0.0%	27	5.1%
5	7	3.9%	14	8.0%	0	0.0%	21	3.9%
	mean	se(mean)	mean	se(mean)	mean	se(mean)	mean	se(mean)
Ill	29.6%	3.4%	28.0%	3.4%	18.9%	2.9%	25.5%	1.9%
Age	38.54	0.96	36.47	0.98	31.62	0.60	35.53	0.51

4.2.2 Domain scores and t-tests

The results of t-tests assessing the statistical significance of the differences in WHOQoL-BREF domain and facet scores between each of the three combinations of three arms (WG member vs. non-member (wgnon); WG member vs. control (wgcontrol); and, non-member vs. control (noncontrol)) are provided in Table 4.2. Although the WHOQoL-BREF is usually intended to be used to compare quality of life domains, rather than individual facets (WHO, 1998), it is useful to look at the facet scores to have an understanding of the differences in specific areas of quality of life between the three study arms. See Appendix N on page 382 for a detailed discussion of these differences. Here, we move on to discuss the remaining differences after the socio-demographic variables and interviewer effects have been accounted for in the multivariate analyses.

4.2.3 Multivariate regression results

Table 4.3 on page 93 (two-pages) details the results of multivariate backwards stepwise regressions estimating each of the WHOQoL-BREF quality of life domain and facet scores according to study arm, socio-demographic variables and interviewer effects (see § 4.1.4.1 on page 81 for detailed specification). The table is colour-coded to highlight the different comparisons dependent on study arm: firstly women in villages containing women's groups vs. control village women (dark blue); then, within the villages containing women's groups, comparisons of women's group members and non-members (light blue); finally, comparisons of all three study arms: each of women's group members (red) and non-members (pink) in comparison to control area women. The nature of the backward step-wise regression is such that variables that are not $p<0.05$ significant drop out of the model.[12] The variables often included one or more of the comparison groups - in such cases the absence of their coefficients is denoted by "ns" (not significant). In all other cases of variables not remaining in the model, the table contains a blank space. For each of the comparisons, the socio-demographic and interviewer variables remaining in the model are accordingly colour coded. Hatched shading indicates that the variable was significantly negatively associated with quality of life i.e. that it was associated with a lower quality of life score in the corresponding domain or facet. It is useful to start our discussion of the results in Table 4.3 with these variables. The table indicates that being currently ill and being interviewed by interviewer 2 or interviewer 5 were the variables most associated with differences in quality of life scores, and that these variables were almost exclusively associated with negative scores when they remained as significant predictors. Interviewers 3, and 4, in contrast, were significantly associated with systematic differences in fewer domain and facet scores, and were generally associated with higher scores when they were. Table 4.3 on page 93 also shows that being widowed and being older were often significantly associated with negative scores, and that on the few occasions that

[12] note that this fairly stringent cut-off for step-wise regression was used because the number of variables in all of the models meant that spurious associations could arise by chance. Also note that there is no 'correct' method of stepwise regression and that alternative procedures of introducing and removing variables in steps could lead to different final models (Kirkwood and Sterne, 2003, p.341). However, all of the variables initially entered into the model were thought to possibly influence quality of life (§ 4.1.4.1 on page 81). The method used here is the default backward stepwise setting in Stata's **stepwise** command (StataCorp, 2011a).

Table 4.2: T-Tests of the difference in WHOQoL-BREF domain and facet scores between WG members, non-members and control arm women

	WG members (wg) (n=179)		non-members in same village (non) (n=175)		control village women (control) (n=180)		order of scores[a]	T-Test p-values[b]		
Quality of Life Domain (facet)	mean	se(mean)	mean	se(mean)	mean	se(mean)	greatest>least	p wgnon	p wgcontrol	p noncontrol
Physical	**67.23**	**1.58**	**61.87**	**1.42**	**68.09**	**1.48**	**control≈wg>non**	***0.0124***	0.6932	***0.0027***
Pain (q3)	3.89	0.10	4.07	0.09	4.24	0.09	control≈non non≈wg (control>wg)	0.1578	***0.0061***	0.1689
Medicine (q4)	3.55	0.11	2.97	0.11	3.36	0.11	wg≈control>non	**0.0002**	0.2122	***0.0124***
Energy (q10)	3.79	0.10	3.39	0.10	3.67	0.10	wg≈control control≈non (wg>non)	***0.0052***	0.3977	0.0551
Mobility (q15)	3.08	0.09	3.10	0.08	3.24	0.09	wg≈control≈non	0.8752	0.2181	0.2489
Sleep (q16)	3.69	0.10	3.40	0.09	3.78	0.08	control≈wg wg≈non (control>non)	0.0233	0.4700	**0.0013**
Daily activities (q17)	3.92	0.09	3.71	0.08	3.88	0.08	wg≈control≈non	0.0779	0.7183	0.1443
Work capacity (q18)	3.85	0.09	3.67	0.07	3.89	0.08	control≈wg≈non	0.1235	0.7367	0.0385
Psychological	**69.83**	**1.39**	**63.65**	**1.38**	**64.45**	**1.33**	**wg>control≈non**	***0.0018***	***0.0055***	0.6777
Enjoyment (q5)	3.59	0.09	3.74	0.08	3.78	0.09	control≈non≈wg	0.2456	0.1380	0.6982
Life meaning (q6)	3.72	0.09	3.34	0.09	3.46	0.10	wg≈control control≈non (wg>non)	***0.0039***	0.0543	0.3985
Concentration (q7)	4.24	0.07	3.78	0.08	3.85	0.08	wg>control≈non	**3.E-05**	**0.0003**	0.5561
Appearance (q11)	3.79	0.09	3.45	0.10	3.39	0.11	wg>control≈non	***0.0125***	***0.0063***	0.6953
Self satisfaction (q19)	3.98	0.08	3.79	0.08	3.63	0.08	wg≈non non≈control (wg>control)	0.0701	**0.0013**	0.1500
Depression (q26)	3.45	0.10	3.18	0.10	3.36	0.09	wg≈control≈non	0.0622	0.5246	0.1902
Social Relationships	**70.81**	**1.60**	**66.36**	**1.58**	**64.58**	**1.57**	**wg>non≈control**	0.0487	***0.0057***	0.4269
Relationships (q20)	4.16	0.07	3.89	0.08	3.76	0.08	wg>non≈control	***0.0112***	**0.0003**	0.2794
Sex life (q21)	4.00	0.10	3.85	0.09	3.77	0.09	wg≈non≈control	0.2648	0.0797	0.5316
Support (q22)	3.34	0.10	3.30	0.09	3.23	0.09	wg≈non≈control	0.7724	0.4542	0.6162
Environmental	**55.60**	**1.22**	**51.18**	**1.37**	**50.67**	**1.22**	**wg>non≈control**	***0.0164***	***0.0045***	0.7813
Security (q8)	3.89	0.09	3.50	0.09	3.78	0.10	wg≈control>non	***0.0017***	0.3941	0.0300
Envir. Healthy (q9)	3.69	0.09	3.25	0.10	3.56	0.09	wg≈control>non	**0.0008**	0.3235	0.0191
Money (q12)	1.82	0.07	1.85	0.07	1.39	0.05	non≈wg>control	0.7179	**1.E-06**	**1.E-07**
Information (q13)	2.85	0.10	2.80	0.09	2.25	0.09	wg≈non>control	0.6935	**2.E-05**	**5.E-05**
Leisure (q14)	3.30	0.09	3.06	0.09	3.22	0.11	wg≈control≈non	0.0619	0.5455	0.2607
Living conditions (q23)	3.56	0.10	3.35	0.09	3.59	0.08	control≈wg≈non	0.1278	0.7672	0.0516
Health serv. Access (q24)	3.61	0.08	3.67	0.08	3.40	0.09	non≈wg≈control	0.6573	0.0791	0.0271
Transport (q25)	3.07	0.09	2.91	0.09	3.02	0.09	wg≈control≈non	0.2265	0.6969	0.4277
Food enough (q27)	2.91	0.09	2.60	0.10	2.79	0.10	wg≈control≈non	0.0228	0.4019	0.1662
Overall (q1)	**3.17**	**0.09**	**3.02**	**0.09**	**3.64**	**0.08**	**control>wg≈non**	0.2341	**0.0002**	**4.E-07**
Health (q2)	**3.75**	**0.09**	**3.72**	**0.08**	**3.82**	**0.08**	**control≈wg≈non**	0.7744	0.5643	0.3720

[a] ≈ indicates non-significant difference - see T-Test p-value columns. The arms are still in order of mean score though, from highest (left) to lowest (right)

[b] P-values are highlighted to show equivalent significance after adjusting for multiple hypothesis testing using Benjamini and Hochberg's False Discovery Rate correction: (m/N)*s where m is the rank order of the p-value with highest values given highest ranks, N is the total number tested (18 for domain scores, and 75 for facet scores) and s is the signficance rate cut-off level: I have used 0.05, 0.01 and 0.001.

<0.05 **<0.01** **<0.001** E=exponent (base 10) e.g. 2E-06 = 2 x 10^{-6}

other marital status categories to the reference category "married" were associated with quality of life scores, they were also indicated to have a negative association. Education, on the other hand, was found to be generally associated with higher scores in the few areas it was found to be a significant predictor, namely, the psychological domain as a whole and the *q6 life meaning*, *q7 concentration*, *q19 self satisfaction* facets within it; *q27 food enough*; *q12 money* and *q15 mobility* (secondary education only); and *q1 overall* (primary education only).

Moving on to the estimated associations with women's group membership and quality of life. Like the previous table, Table 4.3 on page 93 is arranged with the facets comprising each domain underneath the domain for ease of interpretation. Looking firstly at the physical domain and at village level differences (dark blue shading), it is apparent that women in women's group villages (members and non-members combined) had lower physical domain scores, other variable considered, than women in control areas; and had lower scores specifically in the *q4 medicine*, *q15 mobility* and *q16 sleep facets*. It is apparent that these differences were mainly due to the women's group members having lower scores than the control area women (red shading) although non-members had lower scores for *q16 sleep* (pink shading). Within the women's group villages women's group members were found to have significantly lower *q3 pain* facet scores, but no other significant differences, other variables considered, in scores for the other facets of the physical domain of the WHOQoL-BREF. Indeed, there were no other significant differences in quality of life scores observed between women's group members and non-members within the same village, socio-demographic and interviewer variables considered, except for the women's group members being found to score higher on the *q6 life meaning* facet in the psychological domain (light blue shading).

Overall, psychological domain scores were not found to be significantly different between women's group members, non-members, and women in control areas, although in addition to the women's group members scoring higher on *q6 life meaning*, non-members were found to score lower than controls on this psychological facet, and women in women's group villages were found to score higher on *q7 concentration* on average than women in control areas.

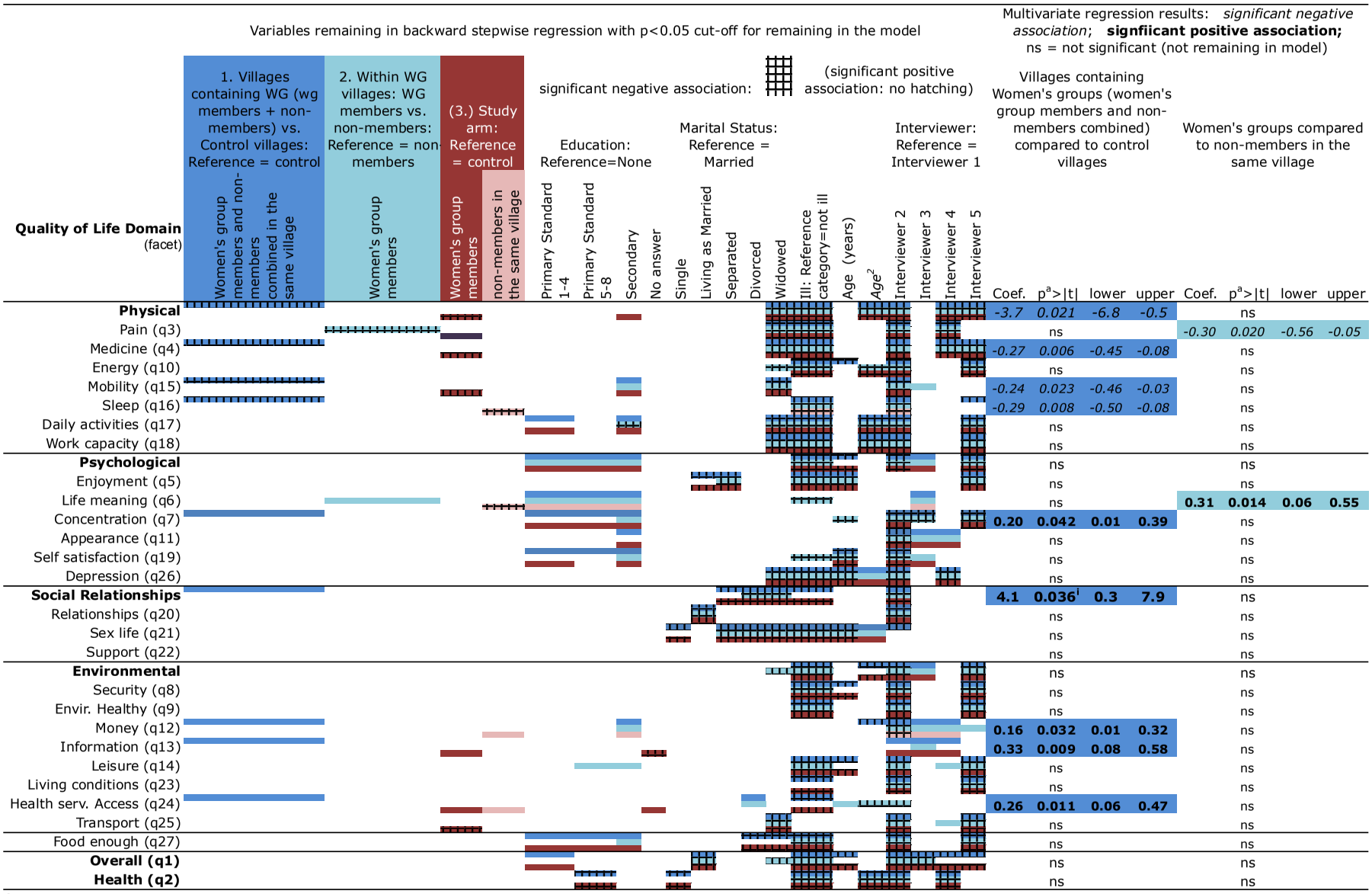
Social relationship domain scores were found to be significantly higher in respondents residing in villages containing women's groups (both members and non-members combined), although this association was just not $p<0.05$ significant after adjusting for multiple hypothesis testing (data not shown, see footnote to Table 4.3 on page 93). However, after controlling for the other variables, no significant differences were found between women's group members and the other study groups. Also, none of the three facets comprising the social relationships domain were found to be significantly different between the study groups.

Environment domain scores were also not found to be statistically different between the study groups. Within the environment domain, however, *q12 money*, *q13 information*, and *q24 health services access* facet scores, were found to be significantly higher in the respondents in villages containing women's groups than the respondents in control villages; although, as stated above, there were no differences in these scores between the women's group members and non-members within the women's-group-containing villages. Women's group members were found, however, to have higher *q13 information*, and *q24 health service access* facet scores, than control

area women (red shading), but lower *q25 transport* scores. Within the environment domain, non-members were found to score higher than control women on the *q12 money* and *q24 health service access* facets. After accounting for differences due to socio-demographic and interviewer effects, no significant differences in the *q1 overall quality of life* and *q2 health* domains were observed between the study arms, and neither were they observed in scores for the *q27 food enough* facet added to the Chichewa WHOQoL-BREF.

In summary, after taking into account the observed associations of education, marital status, illness, age and interviewer with the quality of life score, women's group members were only found to have significantly higher *q6 life meaning* scores than non-members in the same village and significantly higher *q13 information* and *q24 health service access* scores than women in control areas. Given the nature of the women's groups as participatory interventions aimed at improving maternal and neonatal health through facilitating the spread of knowledge and social solidarity (Rosato et al., 2008) these associations are plausible. However, in the case of the latter two, the fact that the scores were not significantly higher in women's group members than non-members in the same village, suggests that it may not be the women's groups that are causing these differences. Indeed, considering the evidence from the tests of the quality of life scores being endogenous to women's group membership, contained in the final columns of the second page of Table 4.3, it seems likely that none of the observed differences between women's group members and either non-members in the same village, or control area women, are likely to be caused by the women's groups. Instead, they are more likely to be just descriptive of the differences between the quality of life of women who are women's group members and women who are not. This conclusion is more in keeping with the associations showing women's groups members to have lower physical quality of life (and lower q25 transport) - associations which if causal would seem implausible given the women's group intervention is not intended to do harm.

Table 4.3: Multivariate estimation of quality of life domain and facet scores



Multivariate regression results: *significant negative association*; **signfiicant positive association;** ns = not significant (not remaining in model)

Quality of Life Domain (facet)	Villages containing Women's groups (women's group members and non-members combined) compared to control villages				Women's groups compared to non-members in the same village			
	Coef.	p[a]>|t|	lower	upper	Coef.	p[a]>|t|	lower	upper
Physical	*-3.7*	*0.021*	*-6.8*	*-0.5*	ns			
Pain (q3)	ns				*-0.30*	*0.020*	*-0.56*	*-0.05*
Medicine (q4)	*-0.27*	*0.006*	*-0.45*	*-0.08*	ns			
Energy (q10)	ns				ns			
Mobility (q15)	*-0.24*	*0.023*	*-0.46*	*-0.03*	ns			
Sleep (q16)	*-0.29*	*0.008*	*-0.50*	*-0.08*	ns			
Daily activities (q17)	ns				ns			
Work capacity (q18)	ns				ns			
Psychological	ns				ns			
Enjoyment (q5)	ns				ns			
Life meaning (q6)	ns				**0.31**	**0.014**	**0.06**	**0.55**
Concentration (q7)	**0.20**	**0.042**	**0.01**	**0.39**	ns			
Appearance (q11)	ns				ns			
Self satisfaction (q19)	ns				ns			
Depression (q26)	ns				ns			
Social Relationships	**4.1**	**0.036[i]**	**0.3**	**7.9**	ns			
Relationships (q20)	ns				ns			
Sex life (q21)	ns				ns			
Support (q22)	ns				ns			
Environmental	ns				ns			
Security (q8)	ns				ns			
Envir. Healthy (q9)	ns				ns			
Money (q12)	**0.16**	**0.032**	**0.01**	**0.32**	ns			
Information (q13)	**0.33**	**0.009**	**0.08**	**0.58**	ns			
Leisure (q14)	ns				ns			
Living conditions (q23)	ns				ns			
Health serv. Access (q24)	**0.26**	**0.011**	**0.06**	**0.47**	ns			
Transport (q25)	ns				ns			
Food enough (q27)	ns				ns			
Overall (q1)	ns				ns			
Health (q2)	ns				ns			

[a] The equivalent significance of the p-values was adjusted to account for multiple hypothesis testing using Benjamini and Hochberg's False Discovery Rate correction: (m/N)*s where m is the rank order of the p-value with highest values given highest ranks, N is the total number tested (3 for domain scores, and 17 for facet scores) and s is the signficance rate cut-off level: I have used 0.05, 0.01 and 0.001. Only the p-value marked i was found to no longer be signficant at the p<0.05 level after these corrections (all of the p-values testing differences in facet scores were found to still be significant)

Table 4.3 continued on the next page

Table 4.3 on the previous page continued:

	Multivariate regression results: *significant negative association*; **signfiicant positive association;** ns = not significant (not remaining in model)										
	Women's group members compared to control				non-members compared to control				Is Quality of life score likely to be endogenous to women's group members?[b]		
Quality of Life Domain (facet)											
	Coef.	p[a]>|t|	lower	upper	Coef.	p[a]>|t|	lower	upper	F	H	S
Physical	*-3.5*	*0.029*	*-6.7*	*-0.4*		ns			Yes	Yes	Yes
Pain (q3)	*-0.28*	*0.012*	*-0.50*	*-0.06*		ns			Yes	Yes	Yes
Medicine (q4)	*-0.27*	*0.005*	*-0.47*	*-0.08*		ns			Yes	N/A	Yes
Energy (q10)		ns				ns			Yes	Yes	Yes
Mobility (q15)	*-0.35*	*0.002*	*-0.57*	*-0.13*		ns			Yes	Yes	Yes
Sleep (q16)		ns			*-0.44*	*0.000*	*-0.65*	*-0.24*	**No**	Yes	Yes
Daily activities (q17)		ns				ns			**No**	Yes	Yes
Work capacity (q18)		ns				ns			**No**	Yes	Yes
Psychological		ns				ns			Yes	Yes	Yes
Enjoyment (q5)		ns				ns			Yes	Yes	Yes
Life meaning (q6)		ns			**-0.26**	**0.022**	**-0.48**	**-0.04**	Yes	Yes	Yes
Concentration (q7)		ns				ns			Yes	**No**	**No**
Appearance (q11)		ns				ns			Yes	**No**	**No**
Self satisfaction (q19)		ns				ns			**No**	N/A	Yes
Depression (q26)		ns				ns			Yes	Yes	Yes
Social Relationships		ns				ns			Yes	**No**	Yes
Relationships (q20)		ns				ns			Yes	Yes	Yes
Sex life (q21)		ns				ns			**No**	N/A	Yes
Support (q22)		ns							Yes	**No**	**No**
Environmental		ns				ns			**No**	Yes	Yes
Security (q8)		ns				ns			Yes	Yes	**No**
Envir. Healthy (q9)		ns				ns			Yes	Yes	**No**
Money (q12)		ns			**0.93**	**0.000**	**0.75**	**1.11**	Yes	N/A	Yes
Information (q13)	**0.30**	**0.016**	**0.06**	**0.55**		ns			Yes	N/A	**No**
Leisure (q14)		ns				ns			**No**	Yes	Yes
Living conditions (q23)		ns				ns			**No**	Yes	Yes
Health serv. Access (q24)	**0.25**	**0.034**	**0.02**	**0.49**	**0.27**	**0.023**	**0.04**	**0.51**	Yes	Yes	Yes
Transport (q25)	**-0.23**	**0.037**	**-0.45**	**-0.01**		ns			Yes	N/A	Yes
Food enough (q27)		ns				ns			**No**	Yes	Yes
Overall (q1)		ns				ns			Yes	Yes	Yes
Health (q2)		ns				ns			**No**	Yes	Yes

[b]F=F-test evidence; where the residuals of the full multivariate model predicting the quality of life score are tested in a second model predicting women's group membership with the quality of life score and also eductaion, marital status and interviewer (the three variables found to be significantly associated with women's group membership). The F-test tests whether the residuals are significantly different from zero i.e. that they are also predictors of women's group membership. H=Hausman test evidence; where the coefficients of the independent variables common to the first and second models described for the F-test are tested for equality. S=Seemingly unrelated Estimation test evidence; where the test is the same as for the Hausman but the specification allows for depatures from asymptotic normality.

4.2.4 Focus Group Discussion findings

The full thematic analysis of the focus group discussions (FGD) with women's group members is contained in Appendix G on page 316 for the opinion of the women on the WHOQoL-BREF questions (see §3.2.1.2 for a synthesis) and Appendix M on page 366 for the remainder of themes looking at the benefits and costs of the women's groups as perceived by their members. Appendix G should also contain the opinions of the women on the effect of the groups on each of the areas of quality of life covered by the WHOQoL-BREF, that is, their opinions on whether the answer to the WHOQoL-BREF question is likely to be different between women's group members and other women. However, as is apparent from the thematic analysis of the FGD, following translation of the transcripts to English, despite clear instructions for guidance and probing by the facilitators (see Appendix L on page 358), there were often misunderstandings among the participants, which limited how useful their responses were with respect to this objective. Therefore, it is difficult to compare and contrast the results from the regression analyses with those of the thematic analysis of the FGD for the purposes of cross-validation. Nevertheless, the thematic analysis is still useful for the information it provides on the benefits and costs of the women's groups, as perceived by their members. The following details the various benefits and costs, divided into relevant categories during the thematic analysis, largely in the women's own words. Following this is a brief discussion of how these benefits and costs and differences between women's group members and non-members may be related to the WHOQoL-BREF questions and the quantitive comparisons of their scores described above.

One of the two categories of benefits of the women's groups most voiced by the participants of the focus group discussions were benefits related to maternal, neonatal and child health. For example, many participants talked about the women's groups encouraging delivery, antenatal care, and postnatal care, to be in a health centre or hospital rather than with traditional birth attendants, or relatives, at home in the village. The women talked about the women's groups encouraging health facility use for maternal and neonatal health needs via two main mechanisms. The first was the women's groups providing knowledge about the benefits of health facility delivery and use and convincing women to choose to go to the health facility. The second was the women's groups providing transport to the hospital, either via lobbying other organisations for bicycle ambulances, and obtaining them, or by providing money for transport from group funds. These two mechanisms are means of overcoming delay 1, delay in the decision to seek care, and delay 2, delay in reaching appropriate care, of Thaddeus and Maine (1994)'s seminal 'three delays' model of the causes of maternal mortality. It is interesting to note these observations by the focus group participants, given that MaiKhanda aimed to reduce all three delays - the first two with the women's group community intervention, and the second (via improved referral) and third, the delay in receiving appropriate care once at the health facility, with the MaiKhanda facilities intervention (Colbourn et al., 2012c). Representative examples of the women's responses related to the women's groups catalysing increased health facility use, include:

"*The time I started delivering, we used to deliver through TBAs. Since the arrival of this group, MaiKhanda, we have learnt to go to central.*" [FGD1.p3]

"*Now we see that things have changed now, women when we are about to deliver we carry them to the hospital and they are received properly*" [FGD5.p6]

"[Moderator] *Why did most people deliver here at the village?* [Respondent] *"Because of transportation, you could get sick maybe at night and the hospital was far away. So when the group came, they gave us the bicycle ambulance and now things are different because we are able to get to the hospital early and whenever a woman realises that it is her month she takes off to wait at the hospital.*" [FGD6.p6]

"*preventing maternal and neonatal deaths is by rushing to the hospital and not waiting at the village or at the TBA.*" [FGD2.p13]

"*I used to deliver at home but now I go to the hospital because care is inadequate at the home. When time to deliver was due I could just use the floor without a plastic sheet but at the hospital, a bed is provided and so is a plastic sheet. The baby is delivered at a good place, on a bed.*" [FGD3]

In some cases the women indicated that the 'benefits' of health facility use were due to coercion. For example, one participant said:

"*Whenever a woman is pregnant she is going to the hospital, and anyone who was delivering at the village was fined and taken to the group village headman, and they saw it was better for them to join the group to reduce the problems.*" [FGD6.p1]

It is interesting to note here that the percentage of women delivering at a health facility was compared between women in women's group areas and women in control areas, as part of the main study, and was found to be increasing in both (Colbourn et al., 2012c,b). Although such evidence of a secular trend does not rule out a larger increase in the percentage of women's group members delivering in the facility, which was not accurately measured (Colbourn et al., 2012c), it highlights the fact that the perceptions of the focus group participants may not always be accurate with regard to the effects and 'benefits' of the women's groups.

The second most voiced category of benefits of the women's groups was increased knowledge of issues relating to maternal and child health. Numerous responses of the focus group participants covered general increases in knowledge, and knowledge of specific areas of health. The following specific areas of health knowledge were listed by name: timely antenatal care; family planning and child spacing; nutrition during pregnancy; HIV testing during antenatal care, and in general; going to the hospital for delivery (also see above); knowledge of specific maternal problems and their causes, including anaemia, haemorrhage and ruptured uterus; bilharzia; and birth preparedness. The following quotes illustrate a range of such responses:

"*When you are on the group you take knowledge from your friends that you did not know*" [FDG1.p5]

"*When a woman attends meetings she has good life from the knowledge the women share whilst in groups*" [FGD3.p6]

"*Whenever the couple wants to have sex there nothing that is going to stop them because they are practising family planning. The child does not get malnourished when the parents are practising family planning. If my household is healthy and so are other households, the entire Malawi nation will be healthy*" [FGD3.p6]

"*It has brought us good things because everyone when she is pregnant she's rushing to the hospital. The first pregnancy you are having tested your blood unlike in the past there was nothing like this. Most people it used to take 8 to 9 months for them to start antenatal classes. Nowadays people have learnt that we should start antenatal classes the first month.*" [FGD5.p5]

"*We have learnt a lot such as vegetable production where we share the produce and sell part of it to buy eggs so that we eat balanced diet foods*" [FGD7.p1]

Many women also mentioned that they thought the women's groups helped to reduce deaths of mothers and babies. In this regard the participants were perhaps more accurate with regard to the women's groups reducing mortality of newborns, than of mothers (Colbourn et al., 2012b). Examples of these responses include the following two quotes:

"[Since] *the arrival of this organisation that teaches about good maternal health, we have reduced people's deaths in our village*" [FGD1.p9]

"*I was very happy with this group when it was coming because this group is leading us to end neonatal and adult deaths. Hence I was very happy to join*" [FGD5.p4]

Some focus group participants also mentioned good, or better, maternal experience in general such as having fewer children due to family planning:

"*We learn from [Women's Group Facilitator] who taught us a great deal on what we needed to know on the dangers of bearing children frequently that the cervix wears out and may get torn, one may become anaemic but that we should adopt family planning methods*" [FGD3.p6]

Other benefits of the women's groups that were mentioned in the focus group discussions included: the groups changing the whole community; the groups providing solidarity and encouragement, for example:

"*We now are able to love one another in our group and we visit each other when one gets sick*" [FGD7.p1]

; the groups providing education for children; the groups having an emergency cash fund or bank account, which the participants often indicated was funded by the group's vegetable garden, for example:

"*We use these gardens to grow crops. When we plant the crops, we sell them after harvest. The money we put it to our group account to assist any of us when she falls sick*" [FGD5.p1]

, the groups also using their gardens to improve nutrition, for example:

"*What we benefited here is, we have a garden and when a woman is pregnant she eats various relish and she is healthy*" [FGD6.p7]

, the groups encouraging the women to have higher self-esteem; and encouraging women to change 'harmful' cultural practices, for example:

"*There is change especially when the baby is born, most people used to take pumpkin flowers on its umbilical point. Or taking pestles dirt and put it on its head, all those things they have stopped being practiced since they were just practices before MaiKhanda came. Those things stopped as babies are growing without threads in their waists or on their necks."* [FGD5.p3]

The importance of male involvement in maternal and child health was also highlighted by many participants, on many occasions. For example:

"*At the meeting we received training, when it was also conducted to men it was adding to their motivation to work hard*" [FGD5.p4]

"*To express my gratitude, my husband used to harsh that he couldn't consider my pregnancies, but when this organisation came we are now okay at home. He assists the children and when I conceive, to say the truth he get various foods for a better pregnancy.*" [FGD5.p7]

The costs of the women's groups perceived by the focus group participants were far fewer than the benefits and were mainly focused on things that could be changed about the groups, including: transport to health facilities still being inadequate, often because bicycle ambulances were not secured, for example:

"*As a group when we interact with expectant women is that they have transport problems when they want to go to the hospital. The time is due we are always worried about where we are going to get a bicycle*" [FGD3.1]

; needing money for fertiliser and other inputs to the group's vegetable gardens; and members not attending meetings for a variety or reasons, including sickness of themselves and others, "*laziness*" and "*ignorance*".

As these benefits and costs are concerned with areas of life that the women believe to be important, they can be related to quality of life, and to the facets (questions) of the WHOQoL-BREF, including *q1 overall*, *q2 health*, *q13 information*, *q19 self satisfaction*, *q20 relationships*, *q22 support*, *q24 health services access*, *q25 transport*, and *q27 food enough* (see Appendix E on page 305 for full wording of each question). Notwithstanding the two serious problems of endogeneity and interviewer effects (Table N.2), of these facets, *q1*, *q13*, *q19* and *q20* were found

to be scored significantly higher in women's group members than non-members or women in control areas (Table 4.2).[13] The t-test results for *q13* on the availability of information are particularly interesting as they show that both women's group members and non-members in the same village had scored similarly and significantly higher than women in control areas, something that is backed up by twenty-two responses from the FGD on spreading of knowledge from the groups to non-members (see Appendix M), as well as by the responses concerning the extra knowledge the members get from the groups, quoted above.

The benefits and costs mentioned by the women's group members in the FGD are also interesting as they are similar to those identified by members, as well as non-members in the same village and women in control areas without groups, in a separate exercise, as part of the contingent valuation study (see § 7.4.4.7 on page 212 and Appendix U on page 435).

When the women's group members were specifically asked what a good quality of life consisted of they gave answers concerning: family planning and child spacing; good nutrition; taking good care of one's self and others; having a clean house; living as if you are not poor; access to healthcare; being part of the women's group; religious worship; not being confused; and not being stubborn. A quote from one of the focus group discussion participants explains in detail what good and bad life is, and is worth reproducing in full:

"*I would like to concur with my colleague who has just spoken that good life entails one is able to take good care of herself, children and the husband. Good life means one should go for clinics, when children are sick she should be able to take them to the hospital. Good life also means one's ability to participate in group meetings where they discuss developmental issues and being able to remember your God and worship Him on the Sabbath day. When a woman attends meetings she has good life from the knowledge the women share whilst in groups. Bad life is where one is bearing children frequently and does not participate in group meetings. Bad life is when you cannot join your colleagues when they gather for group meetings and whenever they invite you say; how can I attend meetings with a child on my back, I am also pregnant and this little other one is sick and cannot walk on his own, who is going to stay with him a home and look after him or who can help me carry him so that I attend the group meeting? Such a person does not live a happy life, she is always grumbling; how can I join my friends at group meetings, they participate in group meetings and they work together. Living a separated life is not good. The goodness with gatherings is that you live a happy life. Mostly the group meetings make you free and happy, that is good life*" [FGD3.p6]

Additional responses that were unprompted included: saying that a good quality of life was related to hygiene, for example:

"*Those with low quality life their homes are unhygienic, their children not tidy that is why most of us we say this one...*" [FGD5.p7]

[13] Given that the serious problems of endogeneity and interviewer effects should be upheld, this analysis is merely illustrative of how qualitative information from focus group discussions could be triangulated with quantitative regression results of WHOQoL-BREF domain and facets scores, in any future studies.

; providing for families and having things in the household, having livestock, having food available, for example:

"*The house with low quality life... ...they have inadequate food*" [FGD5.p5]

; having a balanced diet; having energy; healthy living; HIV testing; family planning; good maternal practice; and dressing well. These responses, although not specifically in relation to the effect of the women's groups, cover additional WHOQoL-BREF areas of quality of life including *q5 enjoyment*, *q9 healthy environment*, *q10 energy*, *q11 appearance*, *q12 money*, *q14 leisure*, and *q23 living conditions*, meaning that in total 16 out of 27 of the WHOQoL-BREF facets were mentioned in discussions of quality of life in the FGD before the WHOQoL-BREF was subsequently introduced to the respondents (see Appendix L on page 358 for the topic guide and § 3.2.1.2 on page 60 and Appendix G on page 316 for the discussions of the WHOQoL-BREF facet by facet).

4.2.5 Correlations between different areas of quality of life

Appendix O details the results of the univariate regressions between all 27*26 combinations of the 27 quality of life facets recorded on the WHOQoL-BREF, and is also interesting as it highlights differences between the pilot study and main study populations, which I return to in § 4.3.2 on page 109. The results of the restricted multivariate analyses for each of the WHOQoL-BREF facets for the main study, the focus of this chapter, are detailed in Table 4.4. Each of the 27 rows of the table represents the results of a multivariate regression with one of the WHOQoL-BREF facets as the dependent variable and any socio-demographic variables and other WHOQoL-BREF facets, remaining $p<0.05$ significant after backwards stepwise elimination, as independent variables. The bottom of the two-page Table 4.4 shows the sum of the significant coefficients for each of the quality of life facets, i.e. the sum of the amount they increase (or decrease) each of the other facets by in each of the multivariate regression models they remain significant independent variables in (see §4.1.4.2). The final row of the table provides a ranking of these sums of significant coefficients, which was formally assessed in comparison to similar rankings from the univariate analyses and SEM, as described shortly.

Table 4.5 shows the results of the structural equation model (SEM) including all of the pathways (associations) between socio-demographic and quality of life facet variables and each quality of life facet, identified as significant in the 27 multivariate restricted regression models of Table 4.4. It shows that whilst some of the associations (pathways) lose their statistical significance and the size of their coefficients when the pathways identified in the other multivariate analyses - 'feedback loops' (StataCorp, 2011b, p92) - are taken into account in the SEM (black shading and white text), those remaining significant, are typically similar to those identified in the multivariate models.[14] As for the multivariate models, the ranking of the sum

[14]Please note that when the SEM is repeated with the non-significant coefficients (pathways) removed, the remaining significant coefficients are similar to those of the original SEM. The restricted SEM data is not shown as the restricted model as a whole is a worse fit for the data (Likelihood Ratio test of model: $\chi^2(655) = 1068.57$, $p = 0.0000$, where a significant result implies there may be missing paths in the model (StataCorp, 2011b, p54)), than the full SEM model: Likelihood Ratio test of model: $\chi^2(537) = 498.80$, $p = 0.8798$).

of the significant coefficients can be used as a measure of the relative positive influence of each WHOQoL-BREF facet on the others. Although some coefficients are no longer significant in the SEM, they were included in the ranking - i.e. the ranking was based on the sum of all coefficients in the SEM rather than just significant coefficients - because excluding these pathways from the model makes the model less stable and a worse fit to the data.[15]

Table 4.6 on page 107 summarises the ranking of the 27 WHOQoL-BREF facets according to the univariate analyses (also ranked on the sum of significant coefficients - where significance was corrected for multiple hypothesis testing - see Appendix O), multivariate analyses (Table 4.4) and SEM (Table 4.5). Table 4.6 on page 107 also shows the results of three Kendall's τ statistics tests of the correlations between the three sets of rankings, indicating that the univariate and multivariate are similar (the null hypothesis of independence of ranking is rejected), and that the multivariate and SEM rankings are also 'not independent'. Because the multivariate and SEM analyses take account of the socio-demographic variables, interviewer effects and inter-relationships between the WHOQoL-BREF quality of life facets, they are more likely to give an accurate indication of which facets could be 'fertile functionings' and 'corrosive disadvantages' (Wolff and De-Shalit, 2007). Given the relatively high and statistically significant Kendall τ statistic of the correlations in ranking between them, their rankings were pooled (by summing the separate ranks and ranking on this sum). The facets in Table 4.6 on page 107 are ordered based on this pooled ranking: from facets indicated by the multivariate and SEM analyses to have the most influence on other facets, and hence most likely to be 'fertile functionings' (or corrosive disadvantages[16]), at the top, to facets indicated to have least influence at the bottom. The ordering, showing *q17 daily activities*, *q12 money*, *q18 work capacity* and *q10 energy* as likely fertile functionings, and *q8 security*, *q15 mobility*, *q11 appearance*, and *q14 leisure* as less likely to be, is plausible. However, because other orderings could perhaps also be plausibly 'explained', and are indeed apparent in the pilot study sample (see Appendix O, and § 4.3.2 on page 109), I will refrain from offering explanations for the current ordering here. Instead, in addition to more detailed quantitative analysis on larger samples of people, there is a strong case for future qualitative work to define and elaborate on the observed relationships between the WHOQoL-BREF facets.[17]

In addition to the rankings, Tables 4.4 and 4.5 contain a wealth of information on relationships between specific quality of life facets and socio-demographic variables. For example, that higher levels of education are, other variables considered, associated with higher levels of the Chichewa WHOQoL-BREF facet *q27 food enough*, and also with higher levels of *q7 concentration* and *q14 leisure*, although secondary education appears to have a negative effect on *q1 overall quality of life*. Being either separated, divorced or widowed is, other variables considered, associated with lower levels of *q21 sex life*. Higher levels of *q2 health*, *q17 daily activities* and *q5 enjoyment* are, other variable considered, significantly associated with higher levels of *q1 overall*

[15] see footnote 14. Note that ranking the facets using only the significant SEM coefficients does not alter the results as the ranking is statistically identical to the ranking using all SEM coefficients (Kendall's τ a: 0.6695; p=0.0000; data not shown).

[16] see footnote 10 on page 86

[17] in this study, given the investigation of 'fertile functionings' and 'corrosive disadvantages' was an additional exercise not conceived of in the original main study, the focus group discussions were not tailored to their investigation.

quality of life. Better scores on *q10 energy* and *q26 depression* are associated with better *q2 health* scores. Better scores on *q18 work capacity* are associated with relatively large increases in *q17 daily activities* scores (Tables 4.4 and 4.5), but not the other way round when 'feedback loops' are considered in by the SEM (Table 4.5). Other associations, and especially the negative ones (***bold italics*** in the tables), such as worse scores in q15 mobility being associated with better scores of q26 depression, are less intuitive and perhaps, in some cases, spurious. Space constraints preclude a full discussion of the many and variously plausible, interesting, perhaps causal, and possibly spurious, associations detailed in Tables 4.4 and 4.5. However, readers are encouraged to absorb the information with a view to future investigation of some of them in any larger and more nuanced future studies.

Table 4.4: Multivariate regressions of each WHOQoL-BREF quality of life facet against each other and socio-demographic variables (main study, n=475)

independent variables

negative association: an increase in the level of the dependent variable (quality of life facet) leads to a decrease in the level of the indepenent variable (quality of life facet)

dependent variable (WHOQoL-BREF facet)		Education: Reference=None: Primary Standard 1-4	Primary Standard 5-8	Secondary	No answer	Marital Status: Reference=Married: Single	Living as Married	Separated	Divorced	Widowed	Ill: Reference category=not ill	Age (years)	Age^2	Interviewer: Reference =Interviewer 1: Interviewer 2	Interviewer 3	Interviewer 4	Interviewer 5	q1 overall QoL	q2 Health	Physical domain facets: q3 Pain	q4 Medicine	q10 Energy	q15 Mobility	q16 Sleep	q17 Daily activities	q18 Work capacity	Psychological domain: q5 Enjoyment	q6 Life meaning	q7 Concentration	q11 Appearance	q19 Self satisfaction	q26 Depression	Social domain: q20 Relationships	q21 Sex life	q22 Support	Environment domain: q8 Security	q9 Envir. healthy	q12 Money	q13 Information	q14 Leisure	q23 Living conditions	q24 Health serv. access	q25 Transport	q27 Food enough	constant	R^2
q1 overall QoL	coef.			-0.34			-0.87				-0.22			-0.41	-1.30	-0.44			0.25			0.10		0.11	0.10		0.19																	1.07	
	l_95			-0.61			-1.56				-0.41			-0.61	-1.52	-0.84			0.16			0.02		0.03	0.00		0.11																	0.61	0.461
	u_95			-0.07			-0.17				-0.02			-0.20	-1.08	-0.04			0.34			0.17		0.19	0.20		0.27																	1.53	
	t			-2.45			-2.44				-2.17			-3.93	-11.50	-2.16			5.64			2.38		2.73	2.02		4.63																	4.58	
q2 Health	coef.					-1.84					-2.13		-0.0001		0.38			1.39				0.17					0.18				0.10													1.39	
	l_95					-3.62					-0.41		-0.0019		0.16			0.99				0.10					0.11				0.04													0.99	0.360
	u_95					-0.05					-0.02		0.0000		0.61			1.79				0.24					0.26				0.17													1.79	
	t					-2.03					-2.12		-2.17		3.36			6.79				4.92					4.58				3.07													6.79	
q3 Pain	coef.										-0.31			0.96			1.19				0.51				0.16				0.10	***-0.13***	0.09												1.34	
	l_95										-0.52			0.71			0.62				0.42				0.07				0.02	***-0.23***	0.02												0.78	0.347
	u_95										-0.10			1.22			1.76				0.59				0.26				0.17	***-0.03***	0.16												1.89	
	t										-2.95			7.40			4.12				12.09				3.31				2.58	***-2.49***	2.39												4.71	
q4 Medicine	coef.					-1.99					-0.20			-2.08		-1.83	-1.47			0.37		0.97				0.19		***-0.10***	***-0.13***									***-0.08***					2.78	
	l_95					-3.63					-3.82			-2.21		-2.13	-1.97			0.30		0.02				0.10		***-1.82***	***-0.20***									***-0.15***					2.29	0.687
	u_95					-0.35					-0.02			-1.91		-1.46	-9.83			0.44		0.17				0.28		***-0.02***	***-0.06***									***-0.02***					3.28	
	t					-2.38					-2.13			-23.11		-9.52	-5.90			10.32		2.51				4.28		***-2.39***	***-3.78***									***-2.60***					10.99	
q10 Energy	coef.												-0.0001						0.17		0.12	0.29						0.12	0.29												0.11			-0.94	
	l_95												-0.0002						0.08		0.06	0.22						0.02	0.22												0.03			-1.42	0.539
	u_95												0.0000						0.25		0.19	0.36						0.21	0.36												0.19			-0.45	
	t												-2.64						3.89		3.89	8.09						2.51	8.09												2.81			-3.77	
q15 Mobility	coef.																								0.15					0.14													0.25	0.15	0.63	
	l_95																								0.05					0.03													0.17	0.07	0.20	0.274
	u_95																								0.26					0.24													0.34	0.23	1.06	
	t																								2.96					2.56													5.85	3.61	2.87	
q16 Sleep	coef.								0.69									0.13							0.17			0.08		0.19	0.13		0.14			0.08					0.10		-0.06	
	l_95								0.04									0.06							0.07			0.01		0.09	0.05		0.06			0.01					0.02		-0.53	0.360
	u_95								1.34									0.21							0.27			0.15		0.29	0.20		0.22			0.16					0.18		0.40	
	t								2.10									3.39							3.47			2.14		3.75	3.42		3.37			2.17					2.43		-0.27	
q17 Daily activities	coef.																					0.12		0.07		0.66			0.07													0.07	0.15	
	l_95																					0.07		0.02		0.60			0.01													0.02	-0.11	0.702
	u_95																					0.17		0.12		0.72			0.12													0.11	0.42	
	t																					4.91		2.86		20.88			2.41													2.89	1.12	
q18 Work capacity	coef.												-0.0066				0.32				0.07				0.68		0.06			0.11													0.51	
	l_95												-0.0114				0.05				0.03				0.62		0.01			0.05													0.19	0.682
	u_95												-0.0018				0.58				0.11				0.74		0.11			0.17													0.84	
	t												-2.70				2.33				3.31				21.93		2.53			3.67													3.09	
q5 Enjoyment	coef.						-0.95						-0.0431	0.0005	0.45			0.16	0.20							0.12		0.11					0.12		0.09	0.15	0.12					0.73	
	l_95						-1.68						-0.0840	0.0000	0.25			0.08	0.12							0.02		0.04					0.04		0.01	0.07	0.02					-0.23	0.375
	u_95						-0.23						-0.0024	0.0010	0.64			0.25	0.29							0.21		0.19					0.19		0.17	0.22	0.23					1.70	
	t						-2.60						-2.08	2.00	4.42			3.92	4.51							2.49		3.09					3.10		2.24	3.62	2.34					1.49	
q6 Life meaning	coef.															0.45					***-0.11***					0.16		0.23		0.14					0.10		0.09		***-0.13***			1.14	
	l_95															0.18					***-0.18***					0.06		0.12		0.02					0.01		0.01		***-0.22***			0.54	0.222
	u_95															0.72					***-0.03***					0.25		0.34		0.26					0.20		0.18		***-0.03***			1.73	
	t															3.28					***-2.77***					3.16		4.24		2.36					2.14		2.20		***-2.57***			3.76	
q7 Concentration	coef.		0.26	0.49											-0.55	-0.33	-1.02					0.12		***-0.09***			0.14					0.10		0.10	0.11		0.09					2.08	
	l_95		0.09	0.22											-0.74	-0.54	-1.53					0.05		***-0.16***			0.08					0.03		0.02	0.04		0.03					1.65	0.350
	u_95		0.43	0.76											-0.36	-0.12	-0.51					0.19		***-0.01***			0.21					0.17		0.17	0.18		0.16					2.52	
	t		2.99	3.62											-5.64	-3.12	-3.95					3.53		***-2.23***			4.21					2.87		2.53	2.93		2.79					9.49	
q11 Appearance	coef.														-0.59	0.45				0.11	***-0.25***	0.38								0.24												0.17	1.27	
	l_95														-0.88	0.20				0.01	***-0.34***	0.30								0.13												0.08	0.71	0.401
	u_95														-0.31	0.69				0.20	***-0.15***	0.47								0.35												0.25	1.83	
	t														-4.05	3.53				2.25	***-4.89***	8.99								4.44												4.04	4.44	
q19 Self satisfaction	coef.				-1.60					0.53										***-0.08***	0.08		0.09	0.11	0.22		0.07		0.13			0.10	0.13										0.74	
	l_95				-3.16					0.02										***-0.15***	0.02		0.03	0.04	0.13		0.01		0.07			0.03	0.06										0.29	0.401
	u_95				-0.04					1.04										***-0.01***	0.14		0.16	0.19	0.30		0.13		0.19			0.17	0.20										1.18	
	t				-2.02					2.05										***-2.20***	2.66		2.72	3.12	5.15		2.33		4.16			2.82	3.63										3.26	
q26 Depression	coef.				-2.52								0.0001				-0.90			0.11							0.17						0.19	0.17									0.15	-0.30	
	l_95				-4.65								0.0000				-1.38			0.02							0.07						0.10	0.08									0.07	-0.87	0.329
	u_95				-0.40								0.0002				-0.42			0.20							0.26						0.28	0.26									0.24	0.27	
	t				-2.33								2.00				-3.70			2.47							3.49						4.02	3.83									3.65	-1.03	

Table 4.4 continues on the next page

dependent variable (WHOQoL-BREF facet)		Primary Standard	1-4	Primary Standard	5-8	Secondary	No answer	Single	Living as Married	Separated	Divorced	Widowed	III: Reference category=not ill	Age (years)	Age^2	Interviewer 2	Interviewer 3	Interviewer 4	Interviewer 5	q1 overall QoL	q2 Health	q3 Pain	q4 Medicine	q10 Energy	q15 Mobility	q16 Sleep	q17 Daily activities	q18 Work capacity	q5 Enjoyment	q6 Life meaning	q7 Concentration	q11 Appearance	q19 Self satisfaction	q26 Depression	q20 Relationships	q21 Sex life	q22 Support	q8 Security	q9 Envir. healthy	q12 Money	q13 Information	q14 Leisure	q23 Living conditions	q24 Health serv. access	q25 Transport	q27 Food enough	constant	R^2
		-2.18		-0.99		-4.12	-3.83																																									
														-0.87							0.85	0.60	0.24	2.18	0.44	0.68	2.22	1.21	0.99	0.74	0.90	0.44	1.06	0.49	1.12	1.00	0.49	1.06	1.15	0.63	0.30	0.73	0.63	0.68	0.80		
														-2.63						1.69																													
														<--Sum of significant coefficients-->																																						
														Rank of sum of significant coefficients:		high	med	low																																		
q20	coef.	0.23							-1.20																																								
Relation ships	l_95	0.03							-1.90																																								
	u_95	0.43							-0.51																																								
	t	2.22							-3.39																																								
q21	coef.									-1.68	-1.58	-2.30																																						
Sex life	l_95									-2.28	-2.01	-2.84																																						
	u_95									-1.09	-1.14	-1.76																																						
	t									-5.56	-7.06	-6.35																																						
q22	coef.															0.36																																
Support	l_95															0.15																																
	u_95															0.58																																
	t															3.31																																
q8	coef.															-0.35																																
Security	l_95															-0.61																																
	u_95															0.08																																
	t															-2.58																																
q9	coef.								0.85			0.90																																				
Envir. healthy	l_95								0.10			0.30																																				
	u_95								1.60			1.50																																				
	t								2.21			2.94																																				
q12	coef.														-0.0001			0.88	0.75	0.57																												
Money	l_95														-0.0001			0.72	0.44	0.16																												
	u_95														0.0000			1.05	1.06	0.98																												
	t														-2.35			10.49	4.71	2.74																												
q13	coef.												0.0583	-0.0007	0.48																																
Informa-tion	l_95												0.0084	-0.0013	0.24																																
	u_95												0.1082	-0.0001	0.73																																
	t												2.29	-2.17	3.84																																
q14	coef.			0.26	0.33								-0.0724	0.0008	-0.48			-0.43																														
Leisure	l_95			0.01	0.07								-0.1220	0.0002	-0.78			-0.72																														
	u_95			0.51	0.59								-0.0227	0.0014	-0.18			-0.15																														
	t			2.07	2.52								-2.86	2.69	-3.10			-2.97																														
q23	coef.												0.0090					-0.25																														
Living conditions	l_95										0.58		0.0012					-0.47																														
	u_95										0.09		0.0168					-0.03																														
	t										1.07		2.26					-2.22																														
q24	coef.										0.63																																					
Health serv. access	l_95										0.13																																				
	u_95										1.14																																				
	t										2.46																																				
q25	coef.												-0.0574	0.0008	-0.41				0.51																												
Trans-port	l_95												-0.1005	0.0002	-0.62				0.07																												
	u_95												-0.0142	0.0013	-0.21				0.96																												
	t												-2.61	2.88	-3.97				2.28																												
q27	coef.			0.30	0.28	0.59									-0.38	-0.39																														
Food enough	l_95			0.04	0.01	0.22									-0.62	-0.66																														
	u_95			0.56	0.55	0.97									-0.15	-0.11																														
	t			2.26	2.04	3.10									-3.17	-2.76																														
				0.56	0.87	0.74																																									

Table 4.5: Structural Equation Model of the pathways to each WHOQoL-BREF quality of life facet from the other facets and socio-demographic variables found to be significant in the multivariate restricted regression models (main study, n=475)

independent (Exogenous) variables | **p<0.05 significant (|t|>1.96) in multivariate model but no longer so in SEM** | ***negative association: an increase in the level of the dependent variable (quality of life facet) leads to a decrease in the level of the indepenent variable (quality of life facet)***

Dependent (Endogenous) variables (WHOQoL-BREF facets)		Education: Reference=None: Primary Standard 1-4	Primary Standard 5-8	Secondary	Marital Status: Reference=Married: No answer	Single	Living as Married	Separated	Divorced	Widowed	Ill: Reference category=not ill	Age (years)	Age^2	Interviewer: Reference =Interviewer 1: Interviewer 2	Interviewer 3	Interviewer 4	Interviewer 5	**q1** overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q10** Energy	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q11** Appearance	**q19** Self satisfaction	**q26** Depression	**q20** Relationships	**q21** Sex life	**q22** Support	**q8** Security	**q9** Envir. healthy	**q12** Money	**q13** Information	**q14** Leisure	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q27** Food enough	constant
q1 overall QoL	coef.			-0.34			-0.90				-2.19			-0.46	-1.33	-0.43			0.30								0.20																	1.26
	l_95			-0.62			-1.62				-0.44			0.67	-1.55	-0.84			0.06								0.03																	0.44
	u_95			-0.07			-0.18				0.00			-0.24	-1.11	-0.02			0.53								0.38																	2.08
	t			-2.46			-2.45				-1.94			-4.24	-11.65	-2.05			2.43								2.34																	3.00
q2 Health	coef.					-2.30					-0.48		-0.0001		0.00			-0.04									-0.30					0.22												3.56
	l_95					-4.53					-0.77		-0.0003		-0.47			-0.37									-0.63					0.11												2.17
	u_95					-0.06					-0.18		0.0000		0.46			0.29									0.02					0.33												4.95
	t					-2.02					-3.18		-2.22		0.00			-0.22									-1.83					3.95												5.03
q3 Pain	coef.										-0.33			0.98			1.16				0.51				0.15				0.07	0.01	-0.03													1.33
	l_95										-0.55			0.54			0.55				0.33				0.04				-0.09	-0.19	-0.16													0.53
	u_95										-0.11			1.42			1.77				0.69				0.26				0.23	0.21	0.11													2.36
	t										-2.94			4.32			3.74				5.60				2.66				0.87	0.08	-0.38													2.52
q4 Medicine	coef.					-1.56					-0.57			-2.31		-2.35	-1.54			0.00					0.03			-0.09	-0.03															5.17
	l_95					-3.49					-0.82			-2.53		-2.87	-2.12			-2.03					-0.11			-0.20	-0.14															4.17
	u_95					0.37					-0.32			-2.08		-1.83	-0.95			0.20					0.17			0.01	0.09															6.17
	t					-1.58					-4.51			-20.06		-8.89	-5.17			0.00					0.43			-1.73	-0.47															10.14
q10 Energy	coef.												-0.0001					-0.01			0.18				0.43			-0.03	0.42							-0.02					0.00			0.34
	l_95												-0.0002					-0.17			0.08				0.29			-0.23	0.30							-0.17					-0.13			-0.45
	u_95												0.0000					0.15			0.27				0.57			0.17	0.54							0.12					0.13			1.13
	t												-2.77					-0.13			3.62				5.99			-0.29	7.02							-0.33					0.01			0.84
q15 Mobility	coef.																								0.23					***-0.62***											-0.01	0.88	1.88
	l_95																								0.00					***-1.01***											-0.18	0.51	0.87
	u_95																								0.45					***-0.23***											0.16	1.24	2.90
	t																								1.97					***-3.11***											-0.16	4.69	3.63
q16 Sleep	coef.							0.47											0.23						0.19		0.04			0.42	0.13	0.01				-0.04					-0.05			0.21
	l_95							-0.26											0.10						0.05		-0.16			0.23	0.05	-0.17				-0.19					-0.21			-0.47
	u_95							1.19											0.36						0.33		0.23			0.61	0.21	0.19				0.10					0.10			0.89
	t							1.27											3.38						2.74		0.37			4.32	3.28	0.13				-0.60					-0.64			0.59
q17 Daily activities	coef.																						-0.02		-0.01	0.88			0.07													0.04	0.18
	l_95																						-0.09		-0.08	0.72			0.01													-0.01	-0.26
	u_95																						0.05		0.58	1.04			0.14													0.10	0.61
	t																						-0.47		-0.29	10.97			2.23													1.51	0.78
q18 Work capacity	coef.											-0.0162					1.11				0.38			-0.30			0.31			0.06													2.89
	l_95											-0.0266					0.48				0.20			-0.76			0.13			-0.19													1.54
	u_95											-0.0059					1.73				0.56			0.16			0.50			0.30													4.25
	t											-3.07					3.47				4.19			-1.29			3.30			0.44													4.18
q5 Enjoy-ment	coef.							-1.27				-0.0529	0.0006	0.23				0.03	0.64						-0.14		0.06					0.09			0.15	-0.16	0.14						1.98
	l_95							-2.17				-0.1007	0.0000	-0.03				-1.75	0.30						-0.35		-0.08					-0.05			-0.27	-0.48	0.00						0.53
	u_95							-0.37				-0.0051	0.0012	0.49				0.23	0.97						0.07		0.20					0.22			0.57	0.15	0.27						3.44
	t							-2.75				-2.17	2.13	1.72				0.26	3.72						-1.32		0.85					1.24			0.69	-1.01	2.02						2.68
q6 Life meaning	coef.															0.46					-0.06			0.09			0.18	0.08		0.10					0.15		1.22				***-0.35***		2.26
	l_95															0.15					-0.15			-0.16			0.00	-0.16		-0.11					-0.03		-0.04				***-0.65***		1.27
	u_95															0.77					0.03			0.35			0.35	0.32		0.32					0.33		0.28				***-0.05***		3.25
	t															2.91					-1.25			0.73			1.98	0.65		0.95					1.61		1.51				***-2.25***		4.47
q7 Concent-ration	coef.		0.24	0.48										-0.59	-0.28		-1.16					0.20		-0.02			0.13					0.04			-0.10	0.02			0.15				2.73
	l_95		0.06	0.19										-0.82	-0.51		-1.75					0.07		-0.12			-0.03					-0.08			-0.36	-0.17			-0.03				1.94
	u_95		0.43	0.76										-0.35	-0.06		-0.58					0.32		0.08			0.29					0.16			0.16	0.22			0.33				3.53
	t		2.55	3.27										-4.88	-2.47		-3.92					3.06		-0.37			1.57					0.67			-0.78	0.24			1.59				6.77
q11 Appear-ance	coef.													-0.37	0.39					0.12	-0.18	-0.14								0.77													0.52	-0.16
	l_95													0.86	0.09					-0.13	-0.37	-0.32								0.47													0.30	-1.15
	u_95													0.12	0.70					0.36	0.00	0.04								1.07													0.74	1.21
	t													-1.48	2.50					0.93	-1.93	-1.55								5.08													4.55	-0.23
q19 Self satisfac-tion	coef.				-0.21					1.02										-0.09	0.10		0.52	***-0.21***	0.33		0.11		***-0.27***			0.14	0.13											1.17
	l_95				-0.38					0.29										-0.25	0.00		0.26	***-0.38***	0.13		-0.02		***-0.45***			-0.01	-0.01											0.32
	u_95				-0.03					1.75										0.06	0.20		0.77	***-0.03***	0.54		0.24		***-0.08***			0.29	0.27											2.02
	t				-2.34					2.75										-1.19	1.94		4.01	***-2.34***	3.26		1.71		***-2.85***			1.89	1.86											2.70
q26 Depress-ion	coef.				-2.59								0.0001			-0.80				0.17							-0.04					0.22	0.29										0.14	0.36
	l_95				-4.77								0.0000			-1.34				0.01							-0.13					0.05	0.11										0.02	0.45
	u_95				-0.41								0.0002			-0.27				0.32							0.06					0.40	0.46										0.26	1.16
	t				-2.33								1.68			-2.97				2.14							-0.77					2.48	3.18										2.20	0.86

Table 4.5 continues on the next page

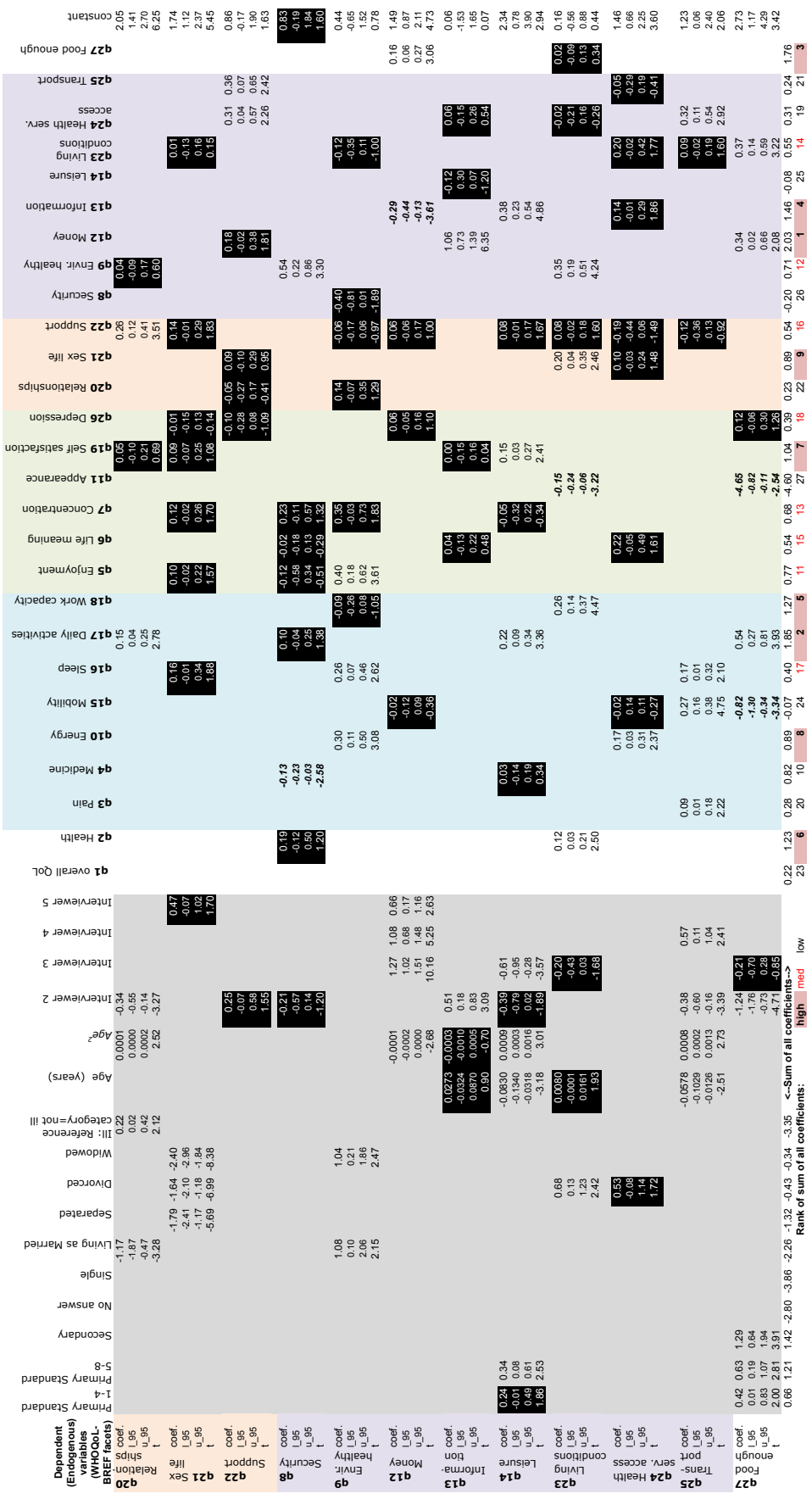

Dependent (Endogenous) variables (WHOQoL-BREF facets)
coef. l_95 u_95 t
q20 Relation-ships
q21 Sex life
q22 Support
q8 Security
q9 Envir. health
q12 Money
q13 Informa-tion
q14 Leisure
q23 Living conditions
q24 Health serv. access
q25 Trans-port
q27 Food enough
Primary Standard
1-4
Primary Standard
5-8
Secondary
No answer
Single
Living as Married
Separated
Divorced
Widowed
III: Reference category=not ill
Age (years)
Age²
Interviewer 2
Interviewer 3
Interviewer 4
Interviewer 5
q1 overall QoL
q2 Health
q3 Pain
q4 Medicine
q10 Energy
q15 Mobility
q16 Sleep
q17 Daily activities
q18 Work capacity
q5 Enjoyment
q6 Life meaning
q7 Concentration
q11 Appearance
q19 Self satisfaction
q26 Depression
q20 Relationships
q21 Sex life
q22 Support
q8 Security
q9 Envir. health
q12 Money
q13 Information
q14 Leisure
q23 Living conditions
q24 Health serv. access
q25 Transport
q27 Food enough
constant
<--Sum of all coefficients-->
Rank of sum of all coefficients:
high
med
low

Table 4.6: Ranking of WHOQoL-BREF facets by their influence on the other facets according to univariate, multivariate and SEM analyses

	Rank of sum of significant coefficents		Rank sum of all coefficients	Pooled rank of multivariate and
WHOQoL-BREF facet	**Univariate**	**Multivariate**	**SEM**	**SEM**[a]
q17 Daily activities	1	1	2	1
q12 Money	15	5	1	2
q18 Work capacity	2	4	5	3
q10 Energy	5	2	8	4
q21 Sex life	17	6	9	5
q27 Food enough	12	13	3	6
q19 Self satisfaction	3	10	7	7
q2 Health	7	12	6	8
q9 Envir. healthy	11	7	12	9
q5 Enjoyment	4	9	11	10
q7 Concentration	10	11	13	11
q22 Support	21	8	16	11
q13 Information	27	20	4	11
q1 overall QoL	19	3	23	14
q23 Living conditions	9	16	14	15
q6 Life meaning	25	15	15	15
q26 Depression	14	14	18	17
q16 Sleep	6	17	17	18
q4 Medicine	24	27	10	19
q24 Health serv. access	23	19	19	20
q25 Transport	8	18	21	21
q3 Pain	26	21	20	22
q20 Relationships	20	22	22	23
q8 Security	16	23	26	24
q15 Mobility	22	25	24	24
q11 Appearance	13	24	27	26
q14 Leisure	18	26	25	26
Kendall's rank correlation	**Univariate**	**Multivariate**	**SEM**	
Multivariate Tau_a = Tau_b	0.3732		0.4815	
p-value[b]	0.02		0.0014	
SEM Tau_a = Tau_b	0.2422			
p-value[b]	0.2211			

[a]in cases where the pooled multivariate and SEM rankings are equal the facets are ordered by the univariate rank

[b]corrected for multiple hypothesis testing (testing three hypotheses at once) using the Sidak correction

4.3 Discussion

4.3.1 Do women's groups improve quality of life?

Women's group members were observed to score higher than non-members in the same village and women in other villages in a number of quality of life domains and facets as measured by the WHOQoL-BREF, but lower in others, in unadjusted analyses. However, following multivariate analyses, it was apparent that most of these differences could in fact be accounted for by differences in socio-demographic variables, and more usually (as would be expected given the fairly good balance of socio-demographic variables between the study arms), interviewer effects, rather than study arm. Most of the remaining observed associations of women's groups with quality of life domain and facet scores were likely, however, to be endogenous to women's group members, i.e. correlation rather than causation, is likely. Therefore this study has not provided any evidence that the women's groups lead to increased quality of life in women. If the available resources for the study had permitted data collection at additional time points, trends in quality of life domain scores in each of the three study arms could have been assessed and more informative conclusions drawn.

It is worth discussing the likely interviewer effects here. Given the random selection of women and villages and the fact that some interviewers scored significantly differently than others within the same comparison group[18], it is less likely that these 'interviewer effects' simply reflect differences between the women interviewed by each interviewer. Discussing the apparent interviewer effects with Interviewers 1 and 2, who seemingly scored differently systematically (Table 4.3 on page 93), it became apparent that both thought there would only be effects on quality of life in the higher-functioning women's groups and that heterogeneity in effects within comparison arms are likely. The interviewers also indicated that different probing styles could have led to different responses and that there also could be bias with respect to women scoring lower if they perceived hand-outs would come as a result of the results showing that they were worse-off. Distinctions in scoring due to differences in use of language by interviewers and respondents, e.g. between *kwambiri* (very much, a score of 4 on the 1-5 scale of the WHOQoL-BREF, see Appendix F on page 311) and *kwambiri zedi* (most, a score of 5), may also have played a role in the observed interviewer effects. Interviewer effects have been observed in other studies in similar settings, including a contingent valuation study of women's group members in Nepal (Borghi and Jan, 2008). To avoid interviewer effects in a repeat study, it would be necessary to be more careful to ensure similar probing styles and use of language, and that each interviewer interviews an equal number of respondents in each study arm. The oversight of the latter provision in particular, in this study, was likely due to unforeseen circumstances resulting in five different interviewers being used instead of the originally envisaged two (see footnote 4 on page 81).

A limitation of the study with regard to the accuracy of the results is that the adjustment of p-values for multiple hypothesis testing could have been under-taken by different methods,

[18] data not shown, although see Table N.2 on page 387 for adjusted regressions including interviewer effects and compare to the unadjusted results in Table N.1 on page 385

such as the slightly more conservative Holm (1979) correction, or a number of other methods that could be chosen based on correlation between parameter estimates and other considerations (Blakesley et al., 2009). As Blakesley et al. (2009) point out, there is room for such methods to be developed further so that they are more ideal to particular situations.

The qualitative data from the focus group discussions indicates that the women value a variety of areas of quality of life, including a number, such as health, information, self satisfaction, social support, access to health services and food, that they believe to be related to the women's groups. The focus group discussions could, however, have yielded more useful information as respondents' answers were sometimes confused and not always clear with respect to the questions being asked (see first paragraph of §4.2.4).

Overall, the answer to the title of this chapter "*Do women's groups improve quality of life?*" is inconclusive: "*maybe, but we would need a repeat study with data collected at more than one time point and careful adherence to processes designed to ensure interviewer effects are minimised; or data that included a suitable instrumental variable to correct for quality of life scores being endogenous to women's group membership*".

4.3.2 Fertile functionings and Corrosive disadvantages

The investigations of the correlations between the different quality of life facets (§4.2.5) were inconclusive with respect to determining which of them may be fertile functionings and which corrosive disadvantages. This was mainly due to the different results between the main and pilot study samples. These differences hint at an instability in the associations between the quality of life facets, i.e. that they can not be generalised to larger populations. The differences could perhaps be explained by the fact that the pilot study sample, mainly conducted in Kamuzu Central Hospital in Lilongwe (§3.1.2), was more urban than the main study population, conducted in rural villages of Lilongwe, Kasungu and Salima districts (§4.1.2). The pilot study sample also contains males (n=121); and other differences between the samples may be dependent on differences in socio-demographic and other characteristics between the populations (see Table 3.1 on page 63 and Table 4.1 on page 88 for the characteristics of the pilot and main study samples, respectively).

The multivariate and SEM analyses of the main study sample were in agreement, however, on a putative ranking of quality of life facets in terms of their influence on the other facets, taking socio-demographic differences into account. As such, in any future larger study, they could be useful methods for teasing out which quality of life facets and capabilities are 'fertile functionings' or 'corrosive disadvantages' (Wolff and De-Shalit, 2007) (also see §2.2.4 and §2.3.2).

The main limitations of the analyses investigating 'fertile functionings' and 'corrosive disadvantages' stem from two serious limitations of the available data: the crude 1-5 scale used to measure each quality of life facet; and the relatively small sample size of only 534 (and only 475 with non-missing data on all variables that could be used in the multivariate regressions) in the main study, the main focus of this analysis. The crude measurement scale is problematic as it precludes the observation of subtler 'effects' of one quality of life facet on another. The small sample size is perhaps more serious for the more sophisticated multivariate analyses, and in

particular the structural equation model that attempts to bring all of the information contained in the 27 separate multivariate regressions together. It precludes the proper exploration of a host of assumptions underlying the SEM, including: correlations between the error variances of the variables included in the SEM; and alternative specifications of the SEM such as ones where each multifaceted WHOQoL-BREF quality of life domain is included as a unobserved latent variable upstream of each of the facets it is made up of, or each multifaceted domain and an 'overall QoL' latent variable upstream of all four of them, are added.[19]

A further limitation of the current analysis was the simple addition of the coefficients as part of the ranking exercise implicitly assumes all 27 of them are equally weighted. An alternative method would be to use preference-weights for each facet - such as those calculated in §6 - in a weighted sum. Given that the results of the analyses are inconclusive, however, such additional calculation is reserved for future more detailed studies.

In addition to a larger sample size, and perhaps also, more nuanced measurement scales for each quality of life concept and a more nuanced method of ranking, further investigations would benefit from data collected at more than one time point. This would allow changes in facet scores to be related to changes in other facet scores. Time-series data with enough time points would also allow investigation of the rates of change, or other higher-order derivatives, of each quality of life facet in relation to changes in each of the other facets. As stated earlier. additional qualitative analysis would also be vital for making sense of any observed relationships, and in it's own right could help steer researchers toward, or away from, putative 'fertile functionings' or 'corrosive disadvantages'. This is especially because such qualitative research could be used to either confirm or refute each of the individual observed relationships identified by the regression analyses, some of which, especially the negative relationships, may not make intuitive sense. Qualitative research could also help shed light on possible effects of aspiration adaptation on self-rating of all the quality of life facets, something which should not be overlooked when interpreting any analyses of associations between different areas of quality of life. Specific further research could also more thoroughly investigate the effects of socio-demographic variables on quality of life facets, for example, determining the effect of education as a putative fertile functioning (Wolff and De-Shalit, 2007), for which this study only yielded limited support.

[19] Please note that these investigations were attempted using the main study sample data, but the models would not converge (even after 3 hours of Stata processing and over 2000 iterations on some occasions).

Part II

Quality of Life Valuation and Willingness-To-Pay

Chapter 5

DCE: rationale, use, heuristics, biases and Malawi

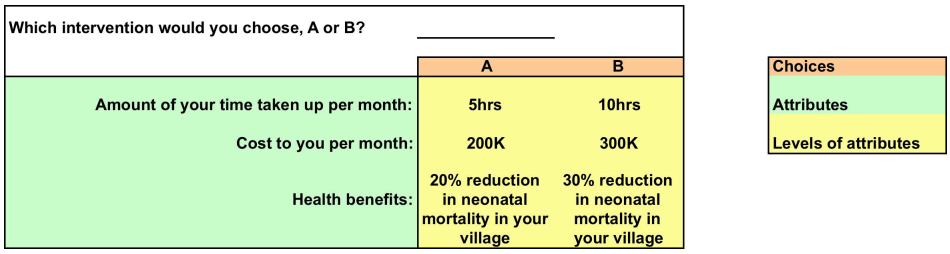
Discrete Choice Experiments (DCE) are an increasingly-used methodology in health economic evaluation and other fields. I begin this chapter with a brief rationale for using DCE and a description of what DCE are including how they relate to underlying theory, and extensions of the method such as best-worst scaling. I then move on to present a review of the state of the art of DCE use in health economics. Following this, I present a detailed review of methodological limitations in the use of DCE with respect to the literature on heuristics and biases and alternative theories of economic behaviour. Here I focus on both practical and theoretical issues. This then leads to a more specific discussion of the feasibility, validity and reliability of use of DCE in Malawi. Chapter 6 then presents my empirical findings on using DCE in Malawi.

5.1 Rationale for using Discrete Choice Experiments

In my study I chose to focus on valuation of dimensions of quality of life by eliciting preferences, despite earlier providing criticism of the use of preferences in valuation of quality of life (§2.1.3-§2.1.5). This decision was made as it is still important to complement more objective assessments of the impact of an intervention, such as those related to mortality reduction (Colbourn et al., 2012b), with subjective assessments related to the opinions of those the intervention seeks to benefit. The preferences of rural Malawian women with respect to the importance of different aspects of quality of life are also interesting in their own right. The remainder of this section focuses on the rationale for using DCE as a method for elicitation of preferences.

There are many alternative methods of eliciting public preferences in use. In an extensive review of such methods Ryan et al. (2001) evaluated the quantitative methods according to eight criteria: "*validity; reproducibility; internal consistency; acceptability to respondents; cost (financial and administrative); theoretical basis; whether the technique offered a constrained choice; and whether the technique provided a strength of preference measure*"; and found "*Conjoint-*

Figure 5.1: Example of a choice that participants have to make in a Discrete Choice Experiment



based methods (including ranking, rating and choice-based), willingness to pay, standard gamble and time trade-off" to be the best quantitative techniques. Discrete Choice Experiments are conjoint-based in the sense that they involve respondents simultaneously considering a number of attributes of the subject/good being valued (i.e. the attributes are conjoint parts of the whole; see §5.2 for a description of DCE).

DCE are especially useful in measuring preferences for non-market goods like the environment and healthcare (Ryan et al., 2008a). Because such goods have no market value, the analyst cannot use data on the 'revealed preferences' of individuals, i.e. how people have chosen, by purchasing, in the past. However, DCE, due to their nature, can measure stated preferences for such non-market goods to gauge how members of a society may value such goods in future. DCE also encourage respondents to trade attributes, therefore encouraging greater consideration of how each attribute is valued compared to others. This is an important distinction to other methods of valuation, such as rating scales, which, by not requiring respondents to consider opportunity costs, are arguably less realistic.

However, DCE also have disadvantages, not least that the way in which respondents complete them may be inconsistent with the theoretical underpinnings of DCE (see §5.2.1, §5.4 and §5.5).

DCE will be used to value the MaiKhanda women's group intervention, specifically to answer the following research question:

Is a utility model derived from a discrete choice experiment a better representation of how women value different facets of quality of life than ranking each quality of life attribute on a 1-5 scale with no trading between them?

As stated earlier in §2.2, the question of whether a utility model itself should be the appropriate output for measuring quality of life will be discussed later (§8.6).

5.2 Description

A DCE involves presenting someone with two or more choices representing different forms of an intervention, or different interventions, from which they have to select one preferred intervention. The choices are described in terms of a number of pre-defined attributes, with choice A varying from choice B in the level of one or more of the attributes (Figure 5.1).

The level at which each attribute in each choice is set varies between a number of levels representative of the intervention(s) in question. Each individual is presented with a number of

choice sets and the answers they give (the interventions they choose) - which should be dependent to some extent on their preferences for specific attributes/levels of attributes - are used to build a statistical model of the preferences of the population. This can then be used to calculate the relative value of each level of each attribute and the overall value of the intervention(s) based on the level of each of the attributes for the specific intervention. The relative value of an attribute compared to the other attributes can also be calculated, as can the probability that an individual will choose one intervention over another given the level of the attributes of each intervention. Socio-economic characteristics of the respondents can also be added to the model to determine their effect on how the intervention(s) are valued and the probability that a specific intervention will be chosen.

By including cost as an attribute in the DCE, the overall value of the intervention (the sum of the values of each attribute) can be determined in monetary terms. This overall value is often termed the Willingness-To-Pay (WTP). The overall net benefit of the intervention can then be calculated by subtracting the costs of the intervention from its overall value (cost-benefit analysis), and then be compared to the status quo or other interventions based on the values of their attributes in relation to those of the intervention. The key advantage of DCE here are their flexibility with respect to derivation of total welfare valuations based on any possible combination of attributes and levels (McIntosh, 2006).

5.2.1 Random Utility Theory underpins DCE

The theory behind DCE, discrete choice theory, is an extension of the standard economic theory of consumer behaviour (expected utility theory). It assumes people are rational decision-makers who seek to maximise their utility by making choices of what to consume according to innate and stable preferences and their budget constraints. Discrete choice theory deviates from classic consumer theory in three ways (Amaya-Amaya et al., 2008). Firstly: the utility gained from a good is a function of the various attributes of that good (Lancaster, 1966); secondly: with discrete choices there is a finite mutually-exclusive number of goods to choose from, not an infinite continuous spectrum of goods with a choice of more than one; thirdly: discrete choice theory stipulates that choice behaviour has a random element and is probabilistic rather than deterministic. This concept of 'random utility' in relation to choice makes the distinction between a systematic element based on a function of the attributes of the good for choice j for individual i:

$$V_{ji} = a_j + \beta_1 x_{j1} + \beta_2 x_{j2} + \ldots + \beta_p x_{jp} \tag{5.1}$$

where x_i are the attributes of choice j; β_1 to β_p are the coefficients that quantify the utility attached to each attribute; and a_j is the constant associated with the unobserved factors influencing the utility derived from choice j;

and a random unobservable element based on heterogeneity of tastes and measurement errors to explain choices made by individuals, ε_{ji} (McFadden, 1974).

The total utility individual i gains from choice j being:

$$U_{ji} = V_{ji} + \varepsilon_{ji} \tag{5.2}$$

Choice j is chosen if, out of all alternatives given in the choice set, if it maximises the individual's utility, i.e., if:

$$(V_{ji} - V_{ki}) > (\varepsilon_{ji} - \varepsilon_{ki}) \tag{5.3}$$

where k represents the alternative choices. However, because $(\varepsilon_{ji} - \varepsilon_{ki})$ is unobservable, it is not possible to determine exactly whether $(V_{ji} - V_{ki}) > (\varepsilon_{ji} - \varepsilon_{ki})$; therefore, only the probability that choice j will be chosen, given the attributes it is described by, and given the characteristics of the individual concerned (if included in the model), can be determined.

Random utility theory describes how a single-metric utility function may be modelled (using techniques such as DCE to obtain empirical data). As such, it supports the single-metric of utilitarianism (§2.1.3) that is rejected by more pluralistic theories of quality of life such as the capabilities approach (§2.1.5). The implications and practicalities of this are discussed in §8.6.

5.2.2 Variations including best-worst scaling

DCE can be completed in a variety of ways, including picking one choice out of two or more options (based on the value of one or more of that choice's attributes), picking one choice out of two or more options, including a 'do nothing' option, and ranking the attributes of each choice. Best-worst scaling (Flynn et al., 2007), employed in my study (§6) involves sequentially choosing the best and worst attributes of each choice or best-worst options of each choice set until all are ranked as 1st, 2nd, 3rd etc. best or 1st, 2nd, 3rd etc. worst.

5.3 State of the art of DCE in health economics

During the last decade or so, DCE have become an increasingly popular method for preference elicitation, and by proxy, benefit valuation, in health economics. In 2008, the first book specifically on the use of DCE in valuing health and healthcare, edited by Mandy Ryan, Karen Gerard, and Mabel Amaya-Amaya and titled *Using Discrete Choice Experiments to Value Health and Health Care* (Ryan et al., 2008a), was published. This book contains much of the state of the art in DCE theory and practice and therefore provides a good structure for a review of the literature on DCE in health economics. I undertook such a review in early 2010, which remains unpublished but an abbreviated version, which I hope provides a good critical overview of the possible uses of DCE in health, follows here.

The book (Ryan et al., 2008a) is divided into three main parts. Part 1 (Chapters 1-3) provides an extensive overview of what DCE are and how they can be used in health economics. Part 2 (Chapters 4-7) then reports four case studies of the use of DCE in valuing health and healthcare. Part 3 (Chapters 8-10) then goes into depth regarding key methodological issues that should be considered when using DCE in health. In a brief Part 4 the editors provide their concluding thoughts.

Chapter 1 (of Ryan et al., 2008a) begins with describing the rationale for DCE and a description of what they are, in material akin to that above in §5.1 and §5.2. Chapter 1 then aims to make the reader aware of the importance of careful consideration of the choice decision in question, and the relevant attributes and levels to include in the DCE, as these all have implications for downstream modelling and application to policy. For example, the levels of each attribute should be based on empirical research where possible, to ensure they are reflective of real life and result in policy-relevant conclusions. However, here, and in the rest of the book, qualitative research on attribute and level development, such as that by Jo Coast and colleagues (Grewel et al., 2006; Coast and Horrocks, 2007; Coast et al., 2011; Al-Janabi et al., 2012), is conspicuously absent. I discuss this further in §8.4. Chapter 1 then moves on to discussion of model estimation. The results of a DCE are typically modelled within a Random Utility Maximisation (RUM) framework (see §5.2.1) to arrive at a logistic regression equation – the utility function of the intervention – (conditional logit model, or Multinomial Logit (MNL)) which estimates the relative value each respondent attaches to each attribute of the intervention. The probability that a specific health intervention with given levels of attributes will be taken up (chosen) by respondents can also be estimated. Interactions terms to determine how the value of attributes changes with respect to respondent characteristics can also be tested for significance, to determine how characteristics of respondents may effect the utility they derive from the attributes/interventions (combinations of attributes) in question. Alternative models to the MNL which could theoretically better represent real-life choice behaviour, such as the nested logit, mixed logit, and latent class models are all discussed, and advice on choosing the correct model for your data is helpfully provided.[1] Finally, chapter 1 contains a section on policy-relevant analyses stemming from DCE. These include those used to predict behaviour and those used to estimate total welfare of changes indicated by the DCE. All relevant formulae are provided and discussed.

Chapter 2 (of Ryan et al., 2008a) gives practical advice on how to design a Discrete Choice Experiment, with particular reference to mathematical considerations necessary to ensure statistical efficiency of the choice set used in the final survey. It aids the researcher in obtaining the maximum amount of information for the least cost. Specifically, the authors focus on the main problems with often-used Orthogonal Main Effects Plans (OMEP); such problems usually being overlooked in the design of DCE. Firstly, OMEP do not take account of any possible correlations between parameters (choice attributes) and therefore make the addition of interaction terms into the utility function impossible. Secondly, OMEP are also over-simplified in the sense that they don't allow for non-linearities in the utilities gained from each attribute – only additive linear utility functions can be estimated. Chapter 2 also highlights the importance of assessing the choice tasks, with respect to ensuring that they are not too cognitively demanding on respondents (I discuss this with reference to my research in §6.1), and ensuring that the choice tasks are realistic and could happen in a real-world setting. The details of the calculation of the relevant information matrices to be compared in tests of the statistical efficiency of DCE designs is helpfully provided for the mathematically inclined. A design is said to be D-optimal

[1] For details of the specification of the model in my study, see §6.4

when the determinant of the information matrix (the inverse of the variance-covariance matrix) is as large as possible. When estimating main effects only, the optimal design will always be the one in which the choices are as different as possible (the design with minimal overlap). When estimating main effects and two-factor interactions, D-optimality is achieved by presenting respondents with a larger number of choice tasks from the total possible. In §6.3.1, I describe how I optimised the design of my choice experiment.

In Chapter 3 (of Ryan et al., 2008b) the design of the DCE in question is examined with respect to the properties of level balance, orthogonality and minimal overlap (utility balance is not discussed as the designers of the example DCE had no *a priori* information on the utilities associated with each attribute). Level balance requires each level of each attribute to occur with equal frequency across all the choice profiles included in the DCE. For the DCE in question this was initially achieved, but when the 'opt out' option was added to all choice tasks, was lost (because the zero level was present in all choices). Orthogonality is often assumed, as it was in the example DCE given, to mean a lack of correlation between the attributes of the DCE. However, it should really mean a lack of correlations between the estimates obtained from the DCE i.e. all components of all effects to be estimated should be uncorrelated as indicated by a diagonal information matrix (see below). Minimal overlap refers to the levels of each attribute being as different as possible between the choices presented in each choice task. The authors construct, step-by-step, a more optimal design of this DCE (99.6% efficient) and compare the optimality of this design with the existing design, only 88.5% efficient and only then because of the inclusion of the 'opt out' option, without which it would be 0% efficient due to the fact that only certain pairings were made between attribute levels.[2] Examination of the variance-covariance matrix also shows that all the pairs of main effects are correlated. These problems stemmed from the fact that only 16 of the possible 32 choice profiles (combinations of attribute levels) were included and the starting design was consequently not of resolution 3 of the full factorial set (for any two attributes the combinations of pairs of levels do not appear with proportional frequencies), thus limiting options (which were poorly utilised anyway) for variation between levels of attributes between choice sets. The actual conduct of the DCE is usually by paper-and-pen questionnaire and as such the standard issues involved in survey research apply (including those related to heuristics and biases, see §5.4). Modelling is then discussed and the results of the estimated MultiNomial Logit (MNL a.k.a. Conditional Logit) model are provided and discussed, with reference to: goodness of fit of the model; the importance of each attribute and the effect of each attribute on utility (whether the attribute is statistically significantly associated with changes in utility, and by how much utility changes given a one-unit change in the level of the attribute); marginal rates of substitution – how much of each attribute respondents are willing to trade-off to get one unit of another attribute - including marginal willingness-to-pay (given that the cost attribute is included in the model); predicting clinic uptake rates (of the screening test in question, dependent on its attributes); and, the concept of compensating variation, which is the change in welfare across the whole population represented by the DCE respondents, that results from changes to attributes of the intervention in question. It differs

[2] e.g. for the attribute *wait*, level 2 was only ever paired with level 16 and never with 8 or 30 so the respondent would never have to choose between 2 and 8 or between 2 and 30

from the marginal willingness-to-pay as only a certain proportion of the population will choose the new intervention. Compensating variation is therefore consistent with random utility theory and with welfare theory, and, therefore, unlike many DCE analyses, is a more correct analysis to employ (see §5.5.3) (Lancsar and Savage, 2004). The prediction of uptake can be determined by calculating the probability that an individual will choose an intervention with a specific set of attributes over other interventions with different sets of attributes; the probabilities that each intervention is chosen being a function of the utility of the specific intervention as determined by the MNL model. I calculate (§6.4) and present all of these outputs (where relevant) from my study in §6.5 and discuss them further in §6.6.

Chapters 4-7 (Part 2) of the Ryan et al. (2008a) book examine case studies of how to use DCE. Chapter 4 describes the importance of DCE in the context of going beyond clinical outcomes when assessing healthcare i.e. it describes how DCE can be used to build up a broader picture of the benefits (and costs) of a specific health intervention. Aspects of the process of care such as waiting time and staff attitudes can be valued, as can non-health benefits such as information and reassurance. In my study, I go further in evaluating non-clinical or non-health-related aspects of the women's group intervention (§2, §4, §6). With respect to the design of the DCE in chapter 4 of the book, the importance of the inclusion of two internal consistency checks is highlighted. These checks are choices where one option is clearly better than the other and should be chosen by rational respondents. One failed consistency check can be put down to random error, but if the respondent fails both checks, all their responses are excluded from the analysis, as it is assumed that their apparent irrationality in the choices they make is due to the fact they don't understand the DCE, and are therefore not completing it properly. In my study, respondents choosing worst levels of an attribute (facet of quality of life) over best levels of any other attribute were considered inconsistent (see Table 5.1 on page 133 and § 6.4 on page 150 for further information). Chapter 4 continues with justification for and specification of the Nested Logit (NL) model, used for the example, because of the opt-out option, which needs to be categorised as a different level of choice, as distinct from the two substantive choices. Segmentation of choice attribute variables by socio-demographic groups e.g. for income groups, if income is hypothesised to affect judgment of the importance of attributes, is also presented and discussed. For my study, the nested logit model is not relevant; small sub-population sizes also precluded segmentation by socio-demographic variables, although segmentation by study arm was explored (§6.4.4).

Chapter 5 (of Ryan et al., 2008a) takes the reader through another example of a DCE used to capture non-health benefits and costs; this time the purpose being to predict re-screening for breast cancer in order to enhance such re-screening. The utility model used for the results of this DCE is specified in detail. Due to the fact that there are multiple observations per respondent (each completes a number of choice tasks), which are likely to be correlated in the sense that the same individual factors (including those unobserved) influence each choice, the error component of the utility function was divided into a systematic individual-specific component and a random component (random effects are specified). Further details of the structure of the model with reference to assumed additive linearity of coefficients and distributions of parameters are also

given. Chapter 5 also makes the point that the oversimplification of attributes (in this example, the accuracy of breast cancer screening with respect to sensitivity and specificity) in order to ensure understanding is a common problem in DCE and may result in the DCE giving an inaccurate answer to a policy question. Such inaccuracy, however, is common to all economic evaluation methodologies in the sense that assumptions and approximations always have to be made in the absence of perfect information. It would be interesting to quantify such inaccuracies of the DCE approach and compare them to the inaccuracies of the cost per QALY approach (and/or other approaches), for example, by using the Expected Value of Perfect Information (EVPI) approach developed by Claxton (1999) and Briggs et al. (2006). Given the different theoretical foundations of the two valuation approaches (DCE and cost per QALY)[3] such work is likely to be difficult, even if we disregard the computational complexity of it. Chapter 5 moves on to discuss the relative advantages and disadvantages of econometrically representing the attributes, using dummy variables for the qualitative attributes, and real numbers for the quantitative attributes, verses effects coding for all attributes. The authors chose effects coding for a number of reasons, including the fact that it enables better identification of non-linear attribute effects, identifies interaction terms independently, enables visualisation of all attributes effects on utility and avoids the problem with respect to the breast screening accuracy attribute of the inclusion of a 100% test accuracy level (as a real number), which in reality is unobtainable. Due to dummy variable coding being adequate for my study, I did not explore the use of effects coding (§6.4).

Chapter 6 (of Ryan et al., 2008a) provides another example of the application of DCE, this time to investigate the extent to which members of the public support the QALY-maximisation approach to assessment of cost-effectiveness that is currently used in the UK by NICE. The chapter is an abridged version of a paper by Bryan et al. (2002) appearing in the journal *Health Economics.* The authors identified the four attributes necessary to investigate the core-components of the QALY-maximisation approach as: number of people helped by the intervention; chance of success of the intervention; number of years people survive due to the intervention; and, quality of life of surviving years. Respondents were interviewed rather than given the questionnaire to complete on their own, in order to aid understanding of the task; I followed this approach in my study (§6.3.1). Interestingly, the 9.7% of respondents failing consistency checks were significantly older, were from lower social classes and defined themselves as in poorer health, than consistent respondents. The were 268 (29.5%) respondents who apparently did not trade between attributes, with more of these (93 respondents) not trading chance of success or survival (80 respondents), than those not trading number of patients (43) or quality of life (52). Unlike for (in)consistency, there was found to be no statistically significant difference between the personal characteristics of non-trading and trading respondents. All respondents were included in the probit model. Whilst it may be understandable to include non-trading respondents because such non-trading behaviour is likely to reflect true preferences in some cases, it is less clear why, given that they are likely not to have understood the task, the inconsistent

[3] i.e. DCE leading to an overall valuation of the intervention (in money if a cost attribute is included), whereas cost-per QALY looking at how much an intervention costs per QALY gained, the weights of the components of which could be gained by preference elicitation methods including DCE.

respondents were also included (the authors do not discuss this). The authors do, however, state that similar model results were obtained when inconsistent respondents were excluded (these results are not shown though). The model results show that all four attributes significantly affected the choice of scenario and are hence all significantly associated with changes in utility. The model is also useful as the ratios of the attribute coefficients enable estimation of the trade-offs between attributes, e.g. looking at the trade-off between survival and quality of life, dividing the survival coefficient (-0.1010) by the quality of life coefficient (-0.8258) results in a value of 0.12 which can be translated to mean that people are prepared to accept a 12% decline in quality of life in order to gain one more year of life. The results of the study give support to the QALY-maximisation approach. However, as is noted by the authors in the discussion of Chapter 6, there are a number of limitations, not least the fact that the DCE approach is very quantitative and forces respondents away from an egalitarian position of equality of access, and the fact that respondents may not have had time to sufficiently consider their choices. These two main criticisms are supported by previous qualitative research (Dolan and Cookson, 2000) which suggests that concerns of equality of access are more important than 'capacity to benefit' (i.e. that QALY maximisation is less supported by the public) and which also showed that public preferences can change with more lengthy reflection and discussion (that was not available in the setting of this DCE). A further criticism, also noted by the authors, is that only a limited number of levels were used for each attribute, making it impossible to estimate utility and trade-offs for the many NHS programmes that involve much larger numbers of patients (100 was the maximum level for the 'number of patients' attribute in this DCE); different chances of success; and/or different levels of survival or quality of life compared to those few included in this DCE. These concerns are valid for the DCE approach in general and should be borne in mind when evaluating DCE as a methodology for assessing health benefits and cost-effectiveness of healthcare interventions, as I discuss further in §8.5.

Chapter 7 (of Ryan et al., 2008a) details another previously-published example of the use of DCE. This example being to assess the preferences of healthcare providers for characteristics of their jobs. DCE are useful in this regard as they enable assessment of the value healthcare workers attach to characteristics of their jobs other than pay. A knowledge of people's preferences for such non-pecuniary factors can be applied to programmes aimed at recruiting and retaining healthcare workers in short-staffed settings. As the authors point out in a lengthy justification, stated preference surveys like DCE are useful for examining preferences for job characteristics and choices because revealed preference data, where it exists, is limited, due to the fact that observed wage differentials in the job market more often exist due to institutional rigidities bolstered by a lack of perfect information on job characteristics; and a lack of freedom for employers to freely change the wage based on ever changing characteristics of jobs/the job market. In the public sector within which this study is focused, wage differentials are even less likely to reflect people's willingness-to-pay for job characteristics, due to national standards of pay which are set by an inefficient and largely-centralised bargaining system. The results of the main effects model confirm the theoretical validity of the DCE, as all the signs of the coefficients are in the right direction. All of the coefficients were statistically significant, meaning

that all attributes had an impact on job choice and utility. Coefficients were divided by the coefficient for percentage salary change and converted to a monetary value (willingness-to-pay) by multiplication with the average net income of the respondents (£60,333). This conversion enables the reader to easily see that the 'being on-call' attribute has the highest monetary value per unit change (£18,057 annual income for change from 'at home not busy' to 'residential very busy') but that other characteristics were also important e.g. working relations with staff (change from 'fair' to 'good' being valued at an annual income change of -£7,060). The results of a model with interaction terms between the job characteristic variables and demographic characteristics shows that having partners and children isn't significantly associated with any of the job characteristics, but that age is significantly associated with how the consultants value being on-call (younger consultants value being less busy and at home when on-call, more than older consultants do) and how much they value increases in annual income (younger consultants valuing increases more).

Chapter 8 (of Ryan et al., 2008a) presents and discusses the many issues that need to be considered when using a price proxy attribute in DCE to determine how respondents value changes in the other attributes/changes in the entirety of the entity being valued. Chief of these concerns is that such use of the price proxy is based on the assumption that individuals are trading between all of the attributes in a 'rational' manner that considers all of the available information. Although this concern can be applied to the valuation of all attributes, it is especially relevant to the price proxy one when it is used to place a monetary value on all the other attributes (see §5.5.3). The effects of both the payment vehicle (how the price proxy attribute is framed) and the price proxy attribute itself are examined in this chapter; and the correct use of the price proxy to estimate marginal rates of substitution and WTP are presented and discussed in detail. Chapter 8 first begins however, with an exploration of the theory underpinning DCE and whether the reality of how people complete DCE reflects this theory. Random Utility Theory (RUT) underpins DCE (§5.2.1). It assumes that respondents are willing to trade between attributes in order to maximise utility after considering all the information presented in the DCE and that their preferences are complete and stable (consistent). The respondent will choose the alternative that gives them the highest utility. Randomness comes into the theory because the researcher cannot observe the true utility function of the population given: heterogeneity in preferences of different members of the population; omitted explanatory variables (attributes) from the model; and, factors influencing respondent's decision-making such as random error or different modes of task completion that may be more consistent with bounded rather than pure unbounded rationality. This last reason is more serious, as it undermines the axioms of completeness, stability and consistency of preferences that RUT is based on. Given that there is evidence that such alternative modes of decision-making - which are based on lexicographic preferences and/or the use of simplifying heuristics - occur in practice, it may be that the theoretical basis for the standard analysis of DCE is unsound. I discuss these issues in §5.4. Because mere observation of decision-making consistent with dominance of the price proxy attribute doesn't constitute evidence of lexicographic preferences, an alternative approach to investigation was employed. The authors assumed that respondents made choices in two

steps, first on whether to accept having to pay by any means at all, and second, to make their choice of hospital based on the remaining attributes. This model violates the independence of irrelevant alternatives (IIA) assumption of the multinomial logit model, hence the specification of an alternative model (which is not explained in detail). To test for the presence of this two-step decision-making process, the authors constructed and compared two models, one with all the explanatory variables (attributes) and one only including the price-proxy attribute. If the coefficients for the price variable from each model were significantly different (based on a 'pseudo' t-test adequately explained in the text) then it can be concluded that respondents were trading between the price attribute and the other attributes sufficiently as to rule out general lexicographic decision-making in the sample. The authors rightly point out however, that such lexicographic decision-making may well still be present in some individuals and would require subgroup analysis (possibly based on socio-demographic variables) to detect. Unfortunately, the authors did not undertake such an analysis.

Chapter 9 (of Ryan et al., 2008a) provides a qualitative and quantitative exploration of "irrational" stated preferences. Such preferences are often detected by the failure of internal consistency checks (obvious clear-cut choices where one option is better than the other on one or more attributes, and is no worse on the other attributes – see above). The study presented in this chapter, however, goes further, as it seeks to explain why respondents fail such checks by getting them to write down an explanation of why they made the choices they did. This qualitative data was then analysed to detect common themes for the statement of such 'irrational' preferences. The explanation of such 'irrational' choices is crucial, as the common practice of removing these choices from the analysis often risks biasing the results. The study also investigates the presence of irrational choices via the use of two tests that are arguably more stringent than usual dominated consistency checks (as they are less clear-cut): Sen's Contraction Property (CP) and Expansion Property (EP) tests (Sen, 1993a). Both the CP and the EP tests are based on the fact that none of the choices not chosen should subsequently be chosen when the menu of choices is subsequently expanded or contracted. A number of variables that were hypothesised to be associated with failure of the rationality tests were regressed against a dummy variable, indicating whether the respondent passed or failed the rationality tests. These included whether the test was strong or weak; how different the choices in the choice set were in terms of attribute levels; where in the sequence of questions the second choice in the EP and CP tests was situated; how long the questionnaire with the rationality test was; how difficult the respondents found the choice; how old the respondent was; and how what level of education they had attained. The coefficients for all of these variables were of the correct sign (the results were in line with expectations) and nearly all were significant at the 10% level (results are adequately described in the text). The effect of the placement of the second parts of the test (the sequence) was also as expected, following the three-stage DCE completion theory of: learning (less likely to pass test) followed by learned behaviour (more likely to pass test) and then fatigue (less likely to pass test; the square of the coefficient which models the hypothesised inverse bell curve was negative and significant). The constant term was also large and highly significant, indicating that there are likely to be other factors influencing whether people pass rationality

tests that were overlooked. These were hinted at in the thematic analysis of the qualitative data, which group the reasons for failure of the rationality tests into seven themes: gaining information from other choices that influences the respondent's choices in the second part of the test (epistemic value of the menu); making assumptions based on additional information that was not provided; own experience/protest answers where the respondent doesn't consider the hypothetical nature of the choices; consistent underlying preferences despite failing CP or EP test (usually due to additional assumptions); indifference; random error (respondents indicating that they did not choose as they intended to due to misreading); and, contradictory preferences. The study described in Chapter 9 highlights the fact that as the complexity of a DCE increases, respondents are more likely to answer irrationally. As the authors point out, given that the criteria of minimal overlap and utility balance necessary for statistically efficient design are more likely to increase the difficulty of choices, in some cases it may be better to trade off some statistical efficiency to increase 'respondent efficiency'. The authors recommend further work, including verbal protocol analysis (recording the respondents thinking aloud while they answer the choices) to better understand the reasons for failure (see Table 5.1 on page 133). As part of the pilot study for my DCE, I undertook a small 'think aloud' study to understand how respondents may be trading different facets of quality of life (§6.2).

Chapter 10 (of Ryan et al., 2008a) is concerned with combining stated preference (SP) data from DCE – what people say they will do - with revealed preference (RP) data – the actual choices people made in real world situations. As the authors explain in the introduction, the nature of RP data clearly endows it with high reliability and high face validity (see beginning of §5.5 for definitions) with respect to detailing the choices people (will) make. However, they go on to explain, given that markets are often narrow in price range and correspondingly so in the attributes of their products, SP data can be more useful in situations where the researcher would like to estimate how people value a wider range of benefit bundles. In this respect, SP methods are a useful means of introducing variability into attribute levels where there may be none in the real world market; such variability also gets round the common problem of collinearity of attributes in the real-world market (e.g. side-effects and compliance rates) so enables the measurement of the separate contribution of each attribute to utility. SP data is also useful if one wants to estimate how people would value a new product or service that is not yet available and so has no RP data. Due to the advantages of each, it is useful to combine both RP and SP data together to gain a richer picture of the utility people will derive from new health interventions. The results of such "data fusion" or "data enrichment" will be based both on how people have valued pre-existing attributes of the intervention in the past, and on how they may value new attributes/levels of attributes in the future. The fusion of datasets also enables comparison (via comparison of the error variances) of the marginal utilities calculated for attributes using data from different datasets; in this regard RP and SP data can be compared as can e.g. SP data from the same survey in two different populations, in order to see whether the preference structures of the two populations are similar. The authors point out that the RP data can be collected from different individuals instead, providing the SP data capture the same attributes as the RP data does. The authors also discuss the often-overlooked possibility

that cut-off levels for specific attributes may be present (as opposed to the utility function of the attribute being continuous). Such cut-offs could either be 'hard' whereby if an attribute is below a specific level for an option, that option is not chosen (i.e. the attribute is dominant over the others); or 'soft' whereby a respondent will get less utility if the attribute is below the specific cut-off.

Chapter 11 of the Ryan et al. (2008a) book provides a summary, concluding thoughts and directions for future research, with summaries of thoughts on: experimental design; econometric modelling; data enrichment; complexity effects; non-compensatory behaviour; and, benefit transfer then provided in separate subsections. For complexity effects the authors emphasise the need for more research on how complexity can influence decision-making in DCE, especially given the current context in which there is considerable scepticism as to whether respondents are really understanding the task in front of them and incorporating all the information into their decision-making. The authors also highlight the emotional nature of the often "impossible" trade-offs DCE in health expect people to (hypothetically) make, and the need for further research into the role of emotions in health DCE. The main issues surrounding non-compensatory decision-making are reiterated, along with ideas for further research, utilising methods seeking to minimise such behaviour like: warm-up/training exercises, the use of pictorial representations, and consideration of respondent efficiency as well as statistical efficiency in the design of DCE. Benefit transfer, the authors note, is of emerging concern, given the desire to generalise results of specific DCE studies to situations additional to the specific study's narrow focus. As the number of DCE studies grows, there is increasing scope for such work. However, the quality of studies needs to be high for such work, and many of the earlier DCE studies often had major flaws in their design and analysis. The book concludes with a quote from Jordan Louviere on the rapid growth but still comparative infancy of the field of DCE research. As outlined in many places in the book, there is clearly much scope for future work on many areas concerned with the application of DCE to health and healthcare that are currently unresolved.

I finish this section with some more observations from chapter 8 of the book (Gyrd-Hansen and Skjoldborg, 2008) on how respondents may not complete DCE in accordance with random utility theory (which they are based on) as this makes a good bridge[4] to the next section where such deviations from RUT are explored in detail. Lexicographic preferences involve the respondent making stepwise decisions focusing on the more important attributes first, as opposed to considering all of the information at once (as specified by RUT). Sometimes the respondent may base their decision on only one dominant attribute and clearly does not trade between all of the attributes. Lexicographic preferences may be manifested in a number of ways, including dominance of an attribute only existing above or below a certain threshold of the attribute in question; the respondent protesting about the concept of paying, so always choosing the choice with zero cost; the respondent making a choice based on a specific budget threshold, so only maximising utility when the price proxy attribute is below a specific value; and, the respondent always choosing the cheaper option (the price proxy attribute dominating their decision).[5] There

[4] it shows that researchers at the forefront of DCE theory and practice are aware of these issues

[5] another example of lexicographic preferences is Rawls' lexicographic ordering of justice priorities (see § 2.1.4 on page 34)

is considerable evidence, especially from psychology literature, that *all* these manifestations of lexicographic preferences are used to some extent by respondents to DCE and similar choice-based tasks. The use of such simplifying heuristics implies that not all of the information in the DCE is used in making the decision. Furthermore, it implies that respondents' preferences are not fully formed and that they are often constructed, via the use of these simplifying heuristics, during the completion of the task. As such, preferences may be dependent on how the DCE is framed, something which is especially relevant for the inclusion and use of the price proxy attribute, given that it may be framed in a number of ways (e.g. changes in taxation, insurance premiums or out-of-pocket expenses, see §5.5.3).

5.4 Bounded Rationality, heuristics, adaptive decision-making, and biases

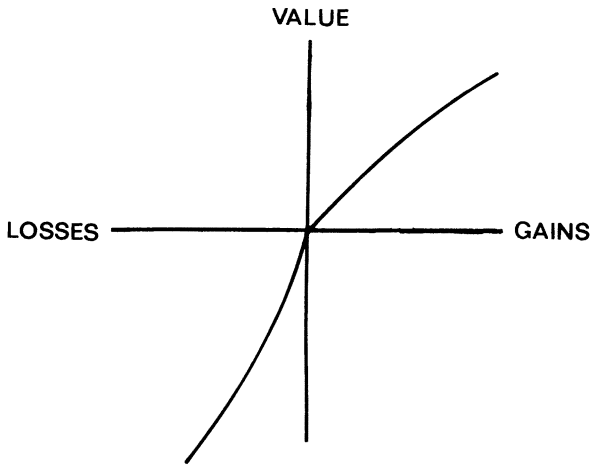
The rational-agent model of economics (see e.g. von Neumann and Morgenstern, 1947), of which the DCE-underpinning Random Utility Theory (RUT), as an extension of expected utility theory (see §5.2.1), is a part, has been under attack from psychologists and those interested in real-world behavioural economics and empirical study of decision-making, for decades. Beginning with Simon (1955, 1956, 1957, 1972), alternative views of decision-making have been developed by a number of researchers, including: Kahneman et al. (1982); Kahneman (2011n), Payne et al. (1993), Klein et al. (1993); Klein (1998), Gigerenzer et al. (1999) and Selten (1998); Gigerenzer and Selten (2001a). The differences between these theories and how they contrast with the rational-agent model and RUT are briefly explored in this section.

Simon (1956) first articulated 'bounded rationality' and proposed *satisficing* as opposed to *optimisation* as a realistic goal for human decision-making. Simon's model of decision-making takes account of both the limitations of human capability ('psychological plausibility') and knowledge and the structure of the environment ('ecological rationality'), which together, as two blades of a metaphorical pair of scissors (Gigerenzer and Selten, 2001b) can be combined to make "good" decisions, even though they are not optimal in terms of the mathematical calculus of expected utility. Simon's original view of bounded rationality had three main features: search for alternatives, satisficing, and aspiration adaptation. If a search results in easy-to-find alternatives, aspirations are raised, and if it doesn't find alternatives that meet aspirations, or finds alternatives that are too hard to attain, aspirations are lowered (Simon, 1957). Despite this criticism of the rational-agent model of economics and a wealth of empirical data backing up Simon's theory (see following paragraphs), 45 years later Selten (2001) found himself re-iterating the need for a re-working of micro-economics based on realistic models of human decision-making i.e. one that's not based on Bayesian maximisation of subjective expected utility, which is unattainable for humans, as they do not have perfect information, infinite computational powers or infinite time. Following the foundations laid by Simon, Selten (1998) articulated Aspiration Adaptation Theory (originally in German: Sauermann and Selten (1962)) as a more realistic guide to human decision-making that is non-optimising, but also not irrational, i.e. bounded rationality.

Gigerenzer (2001) believes that domain-general rules of decision-making (e.g. 'universal calculus') are not useful in many situations, especially those that are non-comparable with other situations. He believes that there is no universal metric of subjective expected utility, that, therefore many goals are incommensurate and cannot be traded-off against each other, and that, as a result, decisions related to goals are specific to the domains of the goals; each domain perhaps being dominated by different heuristics or non-cognitive factors such as emotions, which optimise decision-making within them. Different environments (domains) precipitate different needs and goals, leading to different choices; therefore bounded rational decisions can still be ecologically rational even if they do not have internal consistency of choice (Gigerenzer, 2001). The 'Take The Best' heuristic, for example, goes with the best reason for an alternative and does not compare the best reason with reasons in other domains that are incommensurate. Interestingly, such a lexicographic decision-rule is often just as good as multiple regression (considering other domains), or even better given previously unknown new data, especially if the data is uncertain or scarce, as it does not over-fit the original data (Czerlinski et al., 1999). The 'adaptive toolbox' of 'fast and frugal heuristics' for decision-making expounded by Gigerenzer et al. (1999) and Gigerenzer and Selten (2001a), further articulates a number of other strategies for non-optimal real-world decision-making reflecting bounded rationality. Some of these heuristics such as 'take the best' and 'target setting' are discussed in §5.5.2 (see Table 5.1 on page 133) along with other potential violations of RUT predicted by other theories of decision-making discussed in this section.

Tversky and Kahneman's programme of research on heuristics and biases has also clearly identified the 'limitations' of human reasoning when faced with complex tasks (Tversky and Kahneman, 1974). They have shown, along with others, that human decisions are easily altered depending on how questions are framed (Tversky and Kahneman, 1986) or how people are primed (e.g. with anchors) beforehand (Kahneman, 2011c). Differences in how losses and gains are valued (losses are valued more) and how risks are evaluated in situations involving sure losses or gains, or those that are merely probable (valued differently than their objective probabilities) also contradict expected utility theory (which is based on absolute final amounts), as Kahneman and Tversky (1979) articulated in their Prospect Theory, summarised in Figure 5.2. The steeper slope of the function for losses means people generally exhibit loss aversion. Loss aversion can mean status quo bias, including the endowment effect (not wanting to give up things you already have - unless you see them just as means to other ends e.g. like traders or poor people), and in empirical research the 'loss aversion ratio' is usually about 1.5 to 2.5 i.e. gains need to be 1.5 to 2.5 higher than losses to have the same (reversed) utility (Kahneman, 2011e). The loss aversion ratio has been found to be higher the higher the stakes are and infinite if the possible losses would considerably affect your life - i.e. you would reject the gamble. The concavity of the utility function for gains translates as risk aversion for gains in gambling, and the convexity of the negative utility function for losses translates as risk seeking to avoid sure losses when gambling. The overweighting of low probabilities resultant from the perception of a qualitative change from no chance to a very small probability, and also of high probabilities resultant from the perception of a qualitative change from high chance to certainty, also contradict the invariance

Figure 5.2: Prospect Theory: value function for losses and gains



This figure is Figure 3 in Kahneman and Tversky (1979) and is reprinted with permission from the copyright holders, the Econometrics Society.

axiom of expected utility theory (von Neumann and Morgenstern, 1947) which states that preferences should remain the same regardless of how they are framed. In certain circumstances (e.g. with sequential choices between uncertain outcomes) such overweighting may also violate the dominance axiom (Kahneman, 2011f). Framing and formulation effects should also be considered alongside utility gained or lost as secondary consequences of the decision e.g. regret, self-satisfaction, and frustration. However, such emotions could change in hind-sight. Prospect theory therefore has limitations, for example, it does not account for disappointment or regret (opportunity costs) as it assumes choices are independent of each other, when really satisfaction or disappointment with outcomes is dependent on what the alternative would have been.

According to Kahneman and Tversky, the limitations of human decision-making that they have catalogued result in 'irrational decisions' that are sub-optimal in relation to the ideal of optimisation. Indeed Kahneman still asserts that optimisation and expected utility theory can still be useful when thinking of long-term 'System 2' (well-thought-through) decisions rather than 'System 1' (intuitive and fast) decisions (Kahneman, 2011n). However, others such as Klein et al. (1993) and Klein (1998), and Gigerenzer et al. (1999) believe that the gold standard of decision-making should not be optimisation, which should be seen as an unobtainable fiction (Klein, 1999), and that heuristics are not 'limitations' but are rather useful adaptations enabling reasonable decisions to be made in information-poor and time-limited environments. Kahneman (2011n, p.457-8, note to page 99) counters, stating that actually, for example with the case of the well-known 'fast and frugal' recognition heuristic, the human brain (and its 'System 1' "mental shotgun") is capable of processing vast amounts of information quickly (see also Oppenheimer, 2003). Klein (1999) talks of 'progressive deepening' as a strategy for learning how to make choices that are "not clearly inferior" after "a reasonable examination of the situation" and emphasises the role of expertise[6] that is often overlooked. Such a strategy, he claims, is superior

[6]he uses chess grandmasters as an example

to satisficing which makes do with a choice that is good enough. Although, as he recognises, the qualitative (subjective) ideals of his strategy may compromise the rigour with which it can be researched. Kahneman (2011d) criticises Klein's ideas on the intuition and role of experts, which he believes entirely depend on the regularity of the environment in question - if there is some regularity the expert can use cues to recognise situations. Fire-chiefs, chess champions, and specialists in more regular environments (e.g. anaesthetists) are more able to make good choices based on their intuition, whereas political commentators and traders in zero validity (no regularity) environments are far too confident in their intuitions. Kahneman asserts that the intuitions of these 'experts' can't be accurate due to the lack of regularity of their environments. Indeed, many studies of the long-term forecasts of such experts have been shown to have no correlation to the actual events that transpired (e.g. Fischhoff and Beyth, 1975; Barber and Odean, 2002; Flyvbjerg et al., 2005).

Payne and Bettman believe that the choice of decision-making strategy depends on the context, with people being able and willing to employ more complicated strategies involving weighting attributes and trading between them when the number of attributes and alternatives is smaller, but more likely to use less complicated non-compensatory strategies such as equal weighting of attributes (EQW, or Dawes' rule (Dawes, 1979; Gigerenzer et al., 1999)), lexicographical hierarchical ordering (LEX, see row iv in Table 5.1 on page 135) or a variant of it involving satisficing termed 'elimination by aspects' (EBA) (Tversky, 1972) when there are more attributes and more competing scenarios to choose from. Payne and Bettman (2001) also think that the choice of decision strategy may be a top-down conscious decision in more complicated situations and that it may be bottom-up and faster in other easier situations, including those that have been experienced before. As well as the goals of maximising accuracy and minimising cognitive effort, Payne and Bettman state that additional important goals in the choice of which decision strategy to use are minimising negative decision-related emotions, and maximising the ease of justification of a decision to others. They discuss all of these notions with reference to empirical evidence as well as simulations, which are summarised in Figure 5.3, showing how each strategy performs in terms of accuracy (y-axis) and effort (x-axis) in more complicated (A) or less complicated (B) environments (Payne and Bettman, 2001; Payne et al., 1993). Clearly there is evidence to support the notion that people do not always trade between attributes of choices and often violate RUT (also see §5.5.2) by instead employing adaptive decision-making. However, as Payne and Bettman (2001, p140-1) also point out, people also often fail to follow adaptive decision strategies as they are unduly primed by information in the task such as anchors and the way the choice(s) are framed.

Such biases in decision-making have been a main focus of Kahneman et al. (1982). For example, the choice between objectively similar outcomes can be determined by whether it is framed as a cost you chose to pay for a service, e.g. insurance, a lottery ticket, or a loss, e.g. from a gamble, or not going despite having paid for a membership (Kahneman and Tversky, 1984). Similarly, positive ("keep", "survive") or negative ("lose", "die") framing affects choices. Additional examples were discussed above with reference to prospect theory. Topic- or domain-specific preferences are also likely, e.g. someone who lost a $10 ticket in the theatre entrance

Figure 5.3: Accuracy and Effort of Decision Strategies in Different Environments

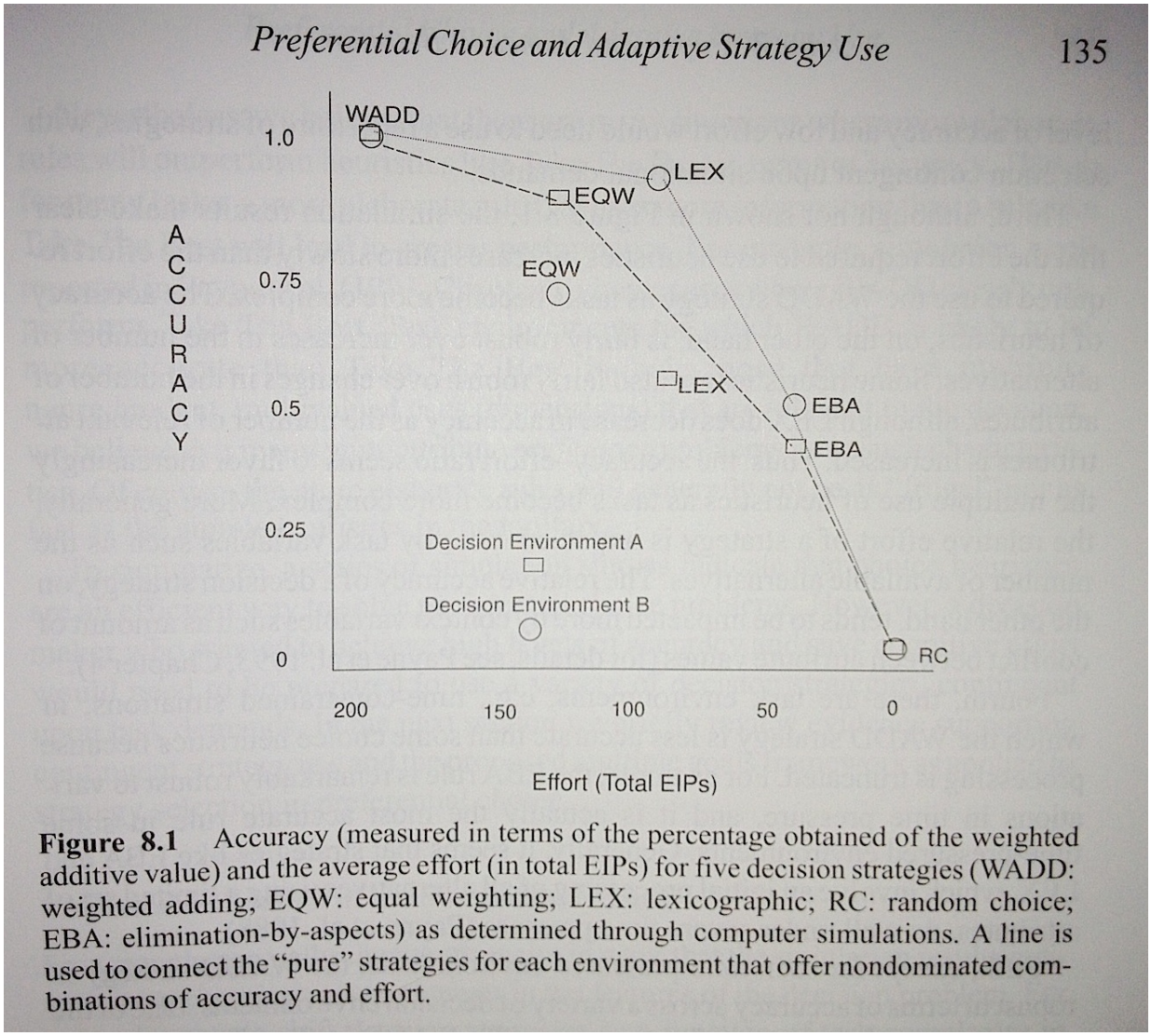


Figure 8.1 Accuracy (measured in terms of the percentage obtained of the weighted additive value) and the average effort (in total EIPs) for five decision strategies (WADD: weighted adding; EQW: equal weighting; LEX: lexicographic; RC: random choice; EBA: elimination-by-aspects) as determined through computer simulations. A line is used to connect the "pure" strategies for each environment that offer nondominated combinations of accuracy and effort.

This figure is Figure 8.1 in Gigerenzer and Selten (2001a) and is reprinted with permission from The MIT Press

being less likely to buy a $10 ticket than someone who lost a $10 note in the theatre entrance and didn't have a ticket in the first place (Kahneman, 2011h), and there is much evidence to suggest that people hold separate 'mental accounts' (Thaler, 1985) for different categories of things. Indeed as Kahneman states in his new book, with reference to Richard Thaler's *Econs* - the rational-agent species that only exists in economics textbooks: "*The fact that logically equivalent statements evoke different reactions makes it impossible for humans to be as reliably rational as Econs*" (Kahneman, 2011j). The context rather than specifics can also be of over-riding importance, e.g. following the Exxon-Valdez disaster, separate contingent valuation studies undertaken to determine people's willingness-to-pay for nets to cover oil ponds in order to save birds, found that average willingness-to-pay to save 2,000, 20,000 and 200,000 birds was $80, $78 and $88 respectively, i.e. that only the concept of 'saving birds' rather than the number of birds was considered (Desvousges and Johnson, 1993).[7] The mood people are in when they answer questions is also important and can be affected by the order in which questions are asked. For example, a study asking students the questions: *how many dates did you have last month?* and *how happy are you?* in that order found the two answers to be correlated, presumably because the respondent frames the happiness question in terms of the information concerning their romantic life that is currently in mind. When the questions were asked the other way round, the answers were not correlated, presumably because the respondents didn't equate their overall happiness just to their romantic life (Kahneman, 2011a; Schwarz et al., 1991). In the WHOQoL-BREF the overall question is asked first so we don't need to worry about this bias for the overall quality of life question at least. Another study found that the answer to *how happy are you?* was associated with the current weather, but that when the respondent was asked (on the phone) what the current weather was, their answer to the happiness question was not correlated to the current weather (perhaps because after the respondent was asked about the weather they primed themselves not to think about their current mood but rather their happiness 'these days') (Kahneman, 2011n, p.458, note to page 103). Rather than underlying preferences being influenced by framing, preferences are often determined by their framing and don't exist independently of them, and, especially in unfamiliar situations, are constructed in a manner heavily influenced by framing (Slovic, 1995).

In summary, whether heuristic decision-making is seen as fast and frugal, adaptive, as a limitation, or as all of the above depending on the context[8], the empirical evidence appears to reject optimisation of subjective utility maximisation that the rational-agent model, RUT and consequently DCE, depend upon. Nevertheless, DCE are still likely to yield more information than simple rating of choices without trade-offs. In my study, the ranking (best-worst scaling) of quality of life scenarios, by forcing respondents to choose i.e. trade-off between attributes, should yield more information on the value of the quality of life attributes than a simple rating of each attribute on a 1-5 scale (the default for the WHOQoL-BREF; see §6). We must remain aware of bounded rationality, heuristics, adaptive decision-making, and biases, however, when

[7] The importance of context in contingent valuation studies is discussed further, and in relation to my contingent valuation study, in §7.5

[8] This is my view. The different views of decision-making presented in this section may all have a little 'theory blindness' (another bias) with respect to the other views!

interpreting the results.[9] It is to these concerns, that I turn to in the following section, which discusses the potential feasibility, validity and reliability of my DCE study in Malawi.

5.5 Feasibility, Validity and Reliability of DCE in Malawi

As detailed above, the nature of DCE and their underlying theoretical assumptions lead to a number of concerns that need attention. These are outlined in the following research questions:

- Are DCE feasible in the Malawian context?
- Can DCE in Malawi produce valid results?
- Can DCE in Malawi produce reliable results?
- Can DCE in Malawi estimate WTP?

The rationale for these research questions and their investigation is detailed below, following a brief explanation of what is meant by validity and reliability:

Reliability refers to the precision of the measurement; the consistency with which results are observed. The main types of reliability for a single method are[10]:

Test-retest reliability: assessment of how consistent the results of the survey are from one time-point to the next. Does the questionnaire produce the same results from the same person if they are retested later? Due to resource constraints test-retest reliability was not assessed in this study (see §6.6).

Inter-rater reliability: assessment of how consistent the results of the survey are from one interviewer to the next. Does the questionnaire produce the same results from the same person (or group of people on average) if they are interviewed by a different surveyor? Inter-rater reliability was potentially low in the quality of life study (see §4.3) and is investigated for the DCE in §6.4 (methods) and §6.5 (results).

Internal consistency: assessment of how consistent the results of each part of the survey are with respect to the other parts. Does the questionnaire produce results that do not contradict other results from the questionnaire?

Inter-method (or parallel forms) reliability refers to assessment of how consistent different methods designed to elicit the same information are.

Validity refers to how accurately the method measures what it has been designed to measure (usually what happens in the real world). The main types of validity important to consider in the context of the use of DCE are:

face validity: assessment of whether the results are approximately in the range of what was intuitively expected. The first and most basic test of validity: does the questionnaire appear to produce results within the range that was expected?

[9] and when applying them, see §8.6

[10] These definitions, and those of the different types of validity, below, are taken from the author's knowledge and with reference to Bowling (2002, p147-151).

construct validity: a more detailed assessment of whether the results accurately measure what the survey was designed to measure. The DCE would have high construct validity if it accurately measured people's preferences for goods based on their attributes (the construct DCE are designed to measure). As DCE are designed to measure preferences using analytical methods reflective of random utility theory, the fact that RUT may not accurately reflect human decision-making (§5.4) means that all DCE may suffer from low construct validity to some extent, but for a good reason: the theory (construct) itself is not valid (is not accurate with respect to real-life behaviour).

convergent validity: assessment of whether the results from the survey agree with those from other surveys designed to measure the same thing. Explored with reference to overall measurement of the benefits of women's groups using quality of life measurement and contingent valuation in §8.1.

external validity: assessment of whether the results from the survey are generalisable to other populations at other times and in other contexts. As well as requiring good sample design (see §4.1.2) external validity also requires that different respondents will complete the task in a similar manner.

Clearly, reliability is necessary but not sufficient for a good degree of validity, which should be achieved by DCE in Malawi (and elsewhere) if they are to be useful for economic evaluation and other applications.

5.5.1 Are DCE feasible in Malawi?

Previous work has indicated that conducting DCE with villagers in developing countries can be difficult. In Nepal, Borghi and Jan (2008) discovered that villagers found a ranking exercise difficult to undertake, indicating that they may find it difficult to trade between attributes in a DCE. Mangham and Hanson (2008); Hanson et al. (2005); Hanson and Jack (2007) have, however, provided evidence that DCEs can successfully be conducted by people in developing countries. While two of these studies were with educated professionals, the study by Hanson et al. (2005) on public preferences for hospital quality in Zambia included illiterate people, providing evidence that illiteracy need not preclude the use of DCE. Approaches analogous to those used by Hanson *et al*, like using colour, were therefore initially explored to aid villagers' understanding of DCE methodology (see §6.1).

Studies have found that lower levels of education (common in Malawi) makes failure of rationality tests more likely. San Miguel et al. (2008) found better-educated people more likely to pass Sen's Contraction Property and Expansion Property tests of rationality (Sen, 1993a). Johnson and Desvousges (1997) and Foster and Mourato (2002) made similar findings. However, Saelensminde (2002) made the opposite finding.

In a DCE in Ghana, Baltussen *et al*, decided the general population 'may not have thought through the trade-offs carefully enough' (Baltussen et al., 2006, p.690); therefore they decided instead to conduct the DCE on health-policymakers, deemed to be 'representatives of the general

population, and have expertise and experience in the matter'. Bearing this in mind, I attempted to ensure participants think through the trade-offs carefully by training the field interviewers well and encouraging them to repeat the explanation of the task until they were confident that respondents understood.

5.5.2 Will the results of the DCE be valid and reliable?

Individuals may not always complete DCE as intended i.e. they may not trade between all of the attributes presented or complete the choices in a 'rational' manner, but instead use 'fast and frugal heuristics' (Gigerenzer and Todd, 1999) or other strategies (see §5.4) to complete choices. Table 5.1 outlines potential violations of Random Utility Theory (RUT) in the context of DCE, explanations for them, implications of their presence with reference to reliability and validity (as defined above), and potential investigations of them. The distinctions between some of the potential violations are subtle (see footnotes to table). Due to time and resource constraints only some of the potential violations could be investigated (see §6.2).

Table 5.1: Violations of Random Utility Theory: description, implications and methods of investigation

Violation of RUT	**Explanation**	**Implications for results**	**Investigation**
i) 'Irrational' choices Clearly dominated choice(s), where one option has less desirable values for all attributes, are chosen.	1) Respondent incorrectly infers additional information about a choice based on the attributes presented. 2) Respondent misinterprets the meaning of an attribute (Ryan et al., 2009).	Results not a true reflection of preferences for attributes presented (violation of internal consistency, face validity and construct validity).	1) Choice sets where one choice is dominated in all attributes by the other will be included in the DCE. Because of evidence suggestive of random errors in the completion of DCE tasks (San Miguel et al., 2008) two such consistency checks will be provided (Ryan et al., 2006).[11] 2) Qualitative follow-up to investigate irrational choices.

[11] These are the inclusion of the 'worst' scenario, card 76 (always depressed) and having worst-level scenarios (red cards) as well as best-level scenarios (green cards) in each choice set; with the two consistency checks being that card 76 should not be chosen above any other mid-level (yellow) or worst-level (red) scenarios and that any worst-level (red) scenario should not be chosen above any best-level (green) scenario (see §6.2 and §6.3)

Violation of RUT	Explanation	Implications for results	Investigation
ii) Dominant attributes The choice is always made with reference to the level of a specific attribute regardless of the levels of other attributes in the DCE (Lancaster et al., 1972; Scott, 2002).	1) Cognitive burden of completing the DCE task (Scott, 2002) / other negative factors such as time pressure, distraction or lack of motivation; 2) Genuine belief that the attribute should not be traded off. This reason indicates a 'rights-based' view of decision-making where deprivation of the dominant attribute is seen as unethical (Lockwood, 1996).	1) The choices participants make in the DCE may not be reflective of their true underlying preferences (violation of construct validity). 2) Underlying preferences are not reflected at all and all we can learn from the DCE is how people answer such complicated questions (violation of construct validity) (Cairns et al., 2002). 3) Difficulties in aggregation of preferences if different attributes are found to be dominant for different people.	1) Analysis to determine whether the choices of any individual are monotonic with respect to the value of one attribute. 2) 'Think aloud' study akin to that undertaken by Ryan et al. (2009).

Violation of RUT	Explanation	Implications for results	Investigation
iii) 'Take the best' heuristic The choice is made after considering one attribute at a time and making the decision as soon as one attribute (or a combination, usually not more than two) can distinguish between the two choices (Gigerenzer and Goldstein, 1999).[12]	as 1) above	as 1) and 2) above	The respondent-specific cue-order in which attributes are considered will be determined by asking each respondent to rate the importance of each attribute.[13] Predictions as to how the respondents would complete the questions will then be made and the actual responses compared to these to determine if the 'take the best' model fits. as 2) above
iv) Lexicographical hierarchical ordering (Drakopoulos, 1994) Respondents consider attributes in order and make a choice based only on the attributes that are not thought to be equivalent in utility between the choices because the levels are considered to be significantly different from each other.	as 1) and 2) above 3) Respondents are indifferent to small differences between attribute levels.	as 1) and 2) above 3) Results still accurate of underlying preferences.	as 2) above

[12] 'Take the best', is equivalent to a dominant attribute (row above in table) if only one attribute distinguishes between the choices; and equivalent to lexicographical hierarchical ordering (row below in table) if more than one attribute distinguishes between the choices.

[13] this is the rating of the importance of each quality of life facet on a 1-5 scale as suggested by the WHO for the WHOQoL-BREF, and is the default that the DCE results will be compared to with respect to how the respondents value the different quality of life facets.

Violation of RUT	Explanation	Implications for results	Investigation
v) Target setting Choices are made by checking that the level of the most important attribute is above a certain threshold particular to the individual's preferences before similarly assessing whether the second most important attribute is above the user's threshold and so on.[14]	as 1) above	as 1) and 2) above	as 2) above
vi) Satisficing Even if people are trading between attributes, it is possible that they are not maximising their utility (i.e. not trading between all attributes), but are merely meeting minimum criteria, so as to save time and effort, to give themselves a satisfactory amount of utility (Simon, 1956).[15]	as 1) above	as 1) and 2) above	as 2) above
vii) Philosophy of basic value (Fischhoff, 1991) Respondents are only able to express values on a small set of topics that are of immediate concern to them and therefore may not have innate preferences for the attributes of the intervention detailed in the choices.	Health interventions are often unfamiliar to respondents; therefore they are more likely to have to construct their preferences during the DCE.	Results still accurate of respondents' preferences	as 2) above

[14]Target setting differs subtly from Lexicographical hierarchical ordering (row above in the table) in that the latter involves consideration of all alternative choice options, whereas with target setting a choice may be made without considering all alternatives

[15]ii) dominant attributes, iii) take the best, and v) target setting, could all be deemed manifestations of satisficing.

Violation of RUT	Explanation	Implications for results	Investigation
viii) Status-quo bias / Choice deferral The cognitive demands of the DCE may have more subtle effects on non-trading behaviour than those described above such as a preference for the status quo (Samuelson and Zeckhauser, 1988) or deferring the choice (choosing the 'neither' option) (Dhar, 1997).	as 1) above	as 1) and 2) above	as 2) above

A 'think-aloud' study of how choices were made in a DCE by Ryan et al. (2009) found respondents appeared not to employ any simplifying heuristics, and apparently irrational responses could be explained by qualitative data. Therefore, despite all the potential problems listed above, valid DCE results may be attainable in similar situations. Respondents were encouraged to think aloud in the pilot DCE, which also involved getting participants to sequentially choose their best and worst scenarios in order to simplify the task (see §6.1 and §6.2).

In addition to the content of the DCE, there are many issues to consider in the presentation of DCE to respondents, including, but not limited to: how much information to give the respondent to start with; framing effects; whether to include a do-nothing or status-quo alternative; and, whether to include a separate question asking which choice is superior.

The rationale for constraining the choice task to a format, also used for the final DCE given to respondents, where only single best and single worst choices of quality of life attribute-levels need be made at one time (see §6.3.2) was influenced by theory as well as by the need to ensure illiterate respondents understood the task. As indicated in Table 5.1, the concept of satisficing suggests that people may be happy to meet minimum requirements rather than think about choices more deeply, in order to save time and effort. Along with the concept of 'philosophy of basic value', that people do not have innate preferences for topics not of immediate concern to them and therefore may not make informed choices (although arguably make choices still on their, incomplete, preferences), the concept of satisficing is perhaps more difficult to investigate in 'think-aloud' studies than the other violations of RUT listed above.

5.5.3 Will the DCE be able to estimate WTP for the intervention?

Discrete Choice Experiments are useful as they also allow the estimation (via marginal rates of substitution) of how much respondents are willing-to-pay for the intervention, if an attribute denoting the cost is included. However, a number of issues exist associated with estimation of willingness-to-pay via inclusion of the cost attribute in the DCE (Ratcliffe, 2000; Gyrd-Hansen and Skjoldborg, 2008). These include: respondents having lexicographic preferences for cost,

which could manifest itself in many forms including protest bids against non-zero costs; respondents always choosing the cheapest option; respondents having thresholds for improvements in other attributes below which they are not willing to increase the price they will pay; responses given in line with pre-defined budget thresholds; responses being influenced by the payment vehicle that the costs are presented in (framing effects) (Skjoldborg and Gyrd-Hansen, 2003); and, cost-based responses whereby respondents may react to the cost attribute by seeing it as a 'reasonable' price to pay for an intervention characterised by the levels of the other attributes rather their own WTP (Gyrd-Hansen and Skjoldborg, 2008).

Ultimately, due to the problem of equating quality of life scenarios (see §6.1), cost was left out of the DCE (see §6.3 for the final content of the DCE). This obviously has implications for directly linking the DCE results to the economic evaluation. Willingness-to-pay for the women's group intervention was, however, estimated in the contingent valuation study (§7), which involved 106 of the 534 total respondents. This measure of value of the women's group intervention could, in theory, be used in calculation of Hicksian Compensating Variation (cv[16]) for changes in each quality of life attribute, using Equations 5.4 and 5.5 explained below. For example, by taking the value of the total difference in quality of life scores due to the women's groups to be worth the equivalent that respondents were willing-to-pay for the women's groups, and then, using the DCE model results (§6), calculating the cv value of changes to the levels of each quality of life attribute relative to this value. Because the results of §4 do not give a clear picture of the total difference in quality of life scores that the women's groups are likely to have brought about[17], it was decided, however, to not pursue such calculation of cv in this thesis.

cv provides an estimate of WTP that is in line with welfare economic theory, as it is a measure of how much money a person needs to be compensated by after a price or quality change to leave them at their initial level of utility (or conversely how much money the individual is willing-to-pay to get the improvement in quality). In 1981 Small and Rosen published their formulation of the cv that uses the logit specification of choice probability:

$$cv = \frac{1}{\lambda}\left[\ln\sum_{j=1}^{J} e^{V_j^0} - \ln\sum_{j=1}^{J} e^{V_j^1}\right] \tag{5.4}$$

where λ is the marginal utility of income V_j^0 and V_j^1 are the values of the indirect utility function before and after the quality change, respectively (if cv or WTP is being calculated with respect to the status quo V_j^0 is set to zero). This formula is useful as, in addition to being in line with welfare economic theory it also takes account of the probability of choosing each choice - something which was overlooked in many DCE in health economics, which used alternative and often inadequate formulae to calculate WTP (Lancsar and Savage, 2004). Compensating variation is, therefore, the change in welfare across the whole population, represented by the DCE respondents, that results from changes to attributes of the intervention in question. It differs from the marginal willingness-to-pay as only a certain proportion of the population will choose the new intervention, i.e. will choose the quality of life attribute-levels it is thought to

[16] please note this is distinct from the abbreviation CV, used to denote Contingent Valuation, the focus of §7

[17] problems of endogeneity and also interviewer effects obscured the results, see §4.1.4.1, §4.2 and §4.3.1.

yield; the probabilities that an intervention is chosen being a function of the utility of the specific intervention (or it's proxy quality of life attribute-levels) as determined by the choice model (see §6.4.1). Note that estimating the *absolute* difference in a person's utility from a change in attributes is impossible without knowing the person's utility in their current situation. Since our limited model of the Indirect Utility Function V does not enable us to measure this[18], and since we are mainly interested in the *relative* difference in utility resulting from a change in the attributes included in our model of the IUF (V), we can set the person's current (inestimable) utility in both the situations before and after the change in attributes we are interested in, to be zero. This enables the log sum expression of Equation 5.4 to be reduced as follows:

$$\begin{aligned} cv &= \frac{1}{\lambda}\left[\ln(e^{V_H^0}+e^{V_C^0}) - \ln(e^{V_H^1}+e^{V_C^1})\right] \\ &= \frac{1}{\lambda}\left[\ln(e^{V_H^0}+1) - \ln(e^{V_H^1}+1)\right] \end{aligned} \tag{5.5}$$

where subscripts $_H$ and $_C$ denote hypothetical and current (inestimable) scenarios respectively (note $e^0 = 1$), and superscripts ^{0} and ^{1} represent initial and new conditions (i.e. before and after the change in attributes we are interested in), respectively (Lancsar and Savage, 2004).

To finish this section, it is also interesting to note that cv can be calculated using any quantitative variable, and not just the marginal utility of income. An illuminating recent example of this is work by Lancsar et al. (2011), who demonstrate calculation of cv from data obtained from a DCE on the marginal utility of a QALY.

[18] i.e. we do not even come close to capturing all of the attributes of life, society etc that may effect a person's overall utility

Chapter 6

Best-Worst DCE to value quality of life

This chapter has three main objectives. Firstly, to explore the feasibility and validity of the use of Discrete Choice Experiments (DCE) in Malawi. Secondly, to explore the use of Best-Worst Scaling (BWS) and the newly-developed Sequential Best Worst MultiNomial Logit (SBWMNL) statistical model for quantifying the results. Thirdly, to construct a utility function that has more information on the preferences of respondents than one constructed using the default rating scale method of the WHO.

The first objective is explored in a detailed account of the empirical development and application of Discrete Choice Experiments (DCE) to assess how rural Malawian women value the different areas of quality of life captured by the WHOQoL-BREF. Here, I specifically focus on issues of content and presentation, which are important given the complex subject matter of the DCE and the fact the respondents in this context have low levels of education and literacy. The development, methodology and results of the pilot studies are described first. The results of the pilot studies are then discussed further with special reference to potential violations of the random utility theory underpinning DCE. The design of the final study is then described both in terms of content and presentation.

The second objective involves detailing alternative statistical modelling strategies, building a case for the use of the SBWMNL, for which data manipulation and computation is described. Testing for heterogeneity of preferences is also described, as is investigation of choice consistency. Separately SBWMNL choice models were computed for each study arm due to evidence of heterogeneity of preferences.

The third objective involves using the choice model results to construct a utility function encapsulating all of the aspects of quality of life measured by the WHOQoL-BREF. Alternative methods of constructing the utility function from the SBWMNL results are first described, and the chosen function is presented. The alternative WHO-recommended method of the use of a simple rating scale for this task, is then described, and the two methods are compared with reference to their observed results and potential applications. This leads to justification of the

use of the DCE-derived preference-weighted utility function, which, using the WHOQoL-BREF results, is then applied to evaluating the benefits of women's groups.

The results pertaining to all three objectives are then discussed in terms of their present, and potential future, applications, whilst also bearing in mind their limitations.

6.1 Pilot studies

Discrete Choice Experiments (DCE) are often conducted in a format where respondents are asked to choose between two or more alternatives, each characterised by a number of attributes at differing levels (§5.2). In the context of a best-worst scaling (BWS) DCE, such a choice experiment would be a case 3 BWS DCE.[1] Originally, I had conceived of such an exercise involving choices between quality of life scenarios at different levels of each of the four main domains of the WHOQoL-BREF: physical, psychological, social relationships and environment. However, such choices proved to be very cognitively demanding: for example, how do you choose between low physical health, intermediate psychological quality of life, high social relationships, and low environmental quality of life on the one hand and high physical health, low psychological health, high social relationships, and intermediate environment on the other hand?[2] Also, there is the problem of characterising each of the WHOQoL-BREF domains as low, intermediate and high without giving further information regarding the levels of each of their component facets. For these reasons, I decided to pursue a simpler BWS DCE, involving sequential best and worst choices between individual WHOQoL-BREF quality of life states, or attribute-levels - 'top', 'mid', or 'bottom' levels, of each facet of the WHOQoL-BREF. The chosen design can be considered a cross between a 'case 1' and a 'case 2' BWS DCE[3], given that although the attributes have different levels, these levels were not varied within the choice set shown to a respondent, and the attribute-levels shown were therefore each considered separately. A simpler 'case 1' DCE involving only the attributes, was avoided for two main reasons. Firstly, without specifying a level of an attribute it is difficult to conceive of what the attribute means, and especially difficult to conceive of what it means in relation to another attribute without the respondent adding additional information not included in the choice task; hence the attributes on their own are difficult to value. Secondly, each quality of life attribute may have considerably different relative value to each of the others at each of the three levels, and such nuances would be missed in any attempt to value the attribute without considering what the different levels mean to respondents. The final design is described fully in §6.3.1 below. Here I focus on the experience of piloting such choice tasks including variations involving ranking by placement of stones from a set total number (to ensure trading).

[1] A case 1 BWS DCE would only ask respondents to choose the best or worst object or issue (i.e. would have no levels for each attribute) and is often called best-worst 'object scaling'. A case 2 BWS DCE would involve respondents evaluating single profiles one-at-a-time and choosing the best and worst attributes (which are each presented at a specific level that can be varied), and is called best-worst 'profile scaling' (Lancsar and Louviere, 2008).

[2] Despite immersion in the subject matter and a lot of education I found such questions difficult and often impossible to answer as did my colleagues and therefore concluded that they would also likely be very difficult for illiterate respondents without much knowledge of the subject matter, to answer.

[3] see footnote 1

In the pilot study a total of ten women in rural villages in Lilongwe district, Malawi (four at one village and six at another) were asked by two trained interviewers to complete a best-worst choice task involving sequentially choosing the best and worst of 10 randomly chosen quality of life states from 81 taken from the WHOQoL-BREF questionnaire (see Figure 6.2 on page 147) i.e. the initial best and worst from the starting 10 cards, each representing a quality of life attribute-level, were taken away leaving 8 cards from which the respondent chose best and worst, which were then taken away leaving 6 and so on. Following this task, for six of the respondents, the same 10 quality of life attribute-level cards were put back on the table and the respondents were then given 20 stones (/beans) and asked to place a number of them on each card corresponding to how much they would like to be in that state. The interviewer explained to the respondent that zero beans could be placed on some cards. The second group of respondents were requested and encouraged to 'think aloud' (see §5.5.2), explaining their reasoning, whilst completing both the best-worst and stone placing choice tasks, and were recorded. The recordings of these respondents 'thinking aloud' were then transcribed and translated and analysed with respect to the quantitative findings. A full explanation of the pilot study, and the instructions for the interviewers, is provided as Appendix P on page 404.

Figure 6.1 shows the quantitative results of the pilot study. It was observed that in general, apart from respondent 915 who had difficulty understanding and completing the task, respondents ranked 'very good' quality of life states (green cards) above 'very bad' states (red cards) with all green cards ranked in the top 5 (Figure 6.1a). Sometimes 'moderate' quality of life states (yellow cards) were ranked above 'very good' states, and 'very bad' states were ranked above 'moderate' states. This can be expected given the different nature of the quality of life facets, for example, '*You get moderately enough food to eat*' (yellow card 80) could be considered by some (like respondent 5) as better than '*You are very satisfied with yourself*' (green card 57); and '*You are very dissatisfied with the support you get from your friends*' could be considered by some who believe their health to be more important (like respondent 914) as better than '*You are neither satisfied or dissatisfied with your health*' (Figure 6.1a; see Figure 6.2 on page 147 for text of each scenario number). Despite the 10 quality of life attribute-states being chosen by random number generation, three respondents (no. 1, 3 and 4) were presented with either two or three scenarios from the same quality of life attribute (but at different levels), serving as consistency checks (see *i)* in Table 5.1). All of these consistency checks were passed (within the same quality of life facet 'very good' -green- was ranked above 'moderate' -yellow-, which was ranked above 'very bad' - red) except for one case where respondent 3 ranked 'moderate' energy for everyday life (yellow card 29[4]) below 'very bad' energy for everyday life (red card 28[5]). Figure 6.1b presents the results of the prioritisation exercise involving placing a number of stones from a total of 20 onto each of the 10 quality of life states representing how important that state is (how much the respondent would like to be in that state). In general, each of the six respondents put more stones on scenarios they had earlier ranked higher, thus corroborating their original ranking and indicating that they were able to complete the task. The only exceptions were respondent 3 who put two stones on the scenario she had previously ranked as 6th

[4] *You have moderately enough energy for everyday life*
[5] *You do not have enough energy for everyday life at all*

best even though she placed no stones on the scenarios she had ranked 4th and 5th best (green bars, Figure 6.1b); and, respondent 1 who put one stone on the scenario she had previously ranked as fifth best but put two stones on each of the scenarios she had ranked 6th and 7th best, one on each of her 8th and 9th best and two on the scenario she had ranked 10th best (worst; dark blue bars, Figure 6.1b). All six of the respondents completed the task by placing all 20 stones on the cards. Interestingly, respondents 3 and 6's stone placing was heavily skewed towards the three scenarios they had ranked as best earlier. Respondent 6 did not place any stones on all seven of her bottom ranked scenarios (orange bars, Figure 6.1b), which were all 'very bad' states (red cards, see Figure 6.1a).

The time taken to complete each of the two pilot study exercises was recorded by the interviewers. For the six respondents completing both exercises, the average time taken was 16 minutes for the best-worst ranking exercise and 28 minutes for the stone placing prioritisation exercise, indicating that the latter was harder for respondents to complete (although respondents 1 and 2 were outliers, taking 35 minutes and 48 minutes respectively to complete the stone placing exercise when the other 4 respondents each took between 15 and 20 minutes). Other observations from the interviewers included: that the concept of 'moderate' levels was sometimes hard to convey; and that these respondents[6] found it difficult and time consuming, and often involved the interviewer having to re-read cards to them repeatedly, which if not done in a careful and neutral manner without over-explanation and contextualisation could lead to the interviewer directing the respondents choices. We now turn to the results of the recordings of the respondents 'thinking aloud' and whether they shed any light on potential violations of Random Utility Theory (RUT).

6.2 Investigation of potential violations of Random Utility Theory

In §5.5.2 I introduced and described potential violations of RUT, the theoretical underpinning of modelling results of DCE (see Table 5.1 starting on page 133) and the idea of 'think aloud' studies as a means to investigate the presence of many such potential violations. 'Case 1' / 'Case 2' BWS DCE such as mine, which involve asking respondents to choose between single attribute-levels from a set, sequentially, rather than between multi-attribute scenarios, only require the investigation of four of the potential violations of DCE presented in Table 5.1, i.e. 'irrational' choices, lexicographic hierarchical ordering, satisficing, and philosophy of basic value. The transcripts of the 'thinking aloud' study recorded from each of the six respondents completing both pilot study exercises (see §6.1 above) were used to determine the presence of these potential violations of RUT, which are discussed in turn below.

'Irrational' choices. Respondent 3 failed a consistency check by ranking 'moderate' energy for every day life below 'very bad' energy for everyday life as noted above. Respondent 915 also

[6] Unfortunately whether or not each respondent in this pilot study was literate or not was not recorded. However, of the 106 respondents who also took part in the CV study, 38% were illiterate and a further 10% semi-literate - see Table 7.2.

Figure 6.1: DCE Pilot study results

(a) Best-worst ranking and levels of quality of life scenarios

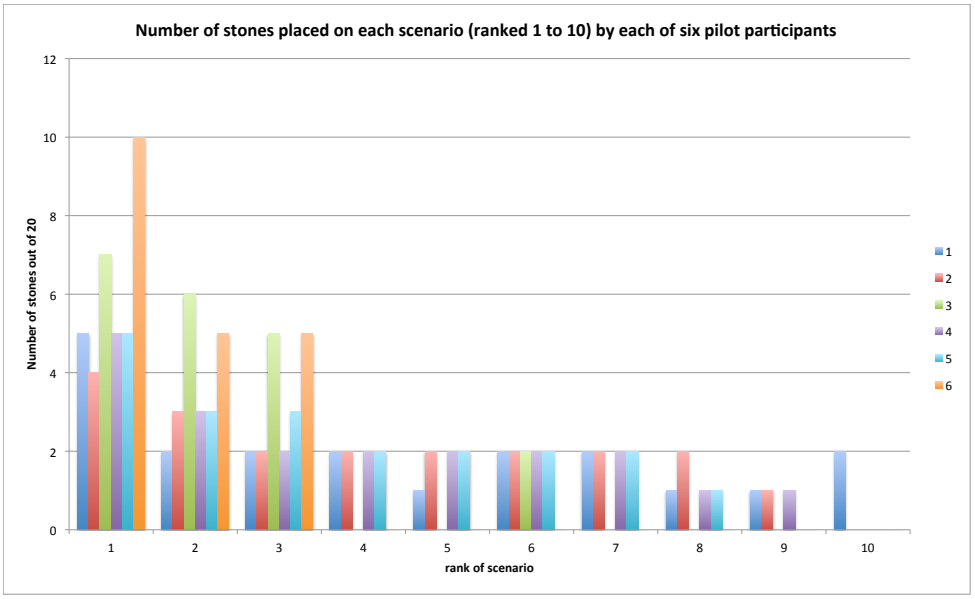
Rank of Scenario

ID no	Best 1	2	3	4	5	6	7	8	9	Worst 10
1	24	6	45	41	44	49	11	11	53	76
2	42	12	61	19	19	29	43	25	79	49
3	78	30	39	75	28	68	25	34	29	5
4	48	35	80	57	56	53	58	31	55	62
5	66	72	72	44	18	23	53	29	77	61
6	27	23	32	49	55	55	31	28	64	70
913	60	15	24	6	51	44	35	25	76	49
914	69	74	20	47	73	40	64	5	26	13
915	25	44	39	51	55	31	54	8	11	76
916	6	60	27	23	74	32	64	70	26	49

Key: very good; moderate; very bad

Scenario numbers in coloured boxes, see Figure 6.2 for text describing scenarios

(b) Placement of stones indicating desirability of quality of life state by rank from best-worst choice task



failed a consistency check by ranking a worst level scenario (red card; card 25: 'your physical environment is not at all healthy') ahead of best level (green cards e.g. 39: 'the information you need in your day-to-day life is completely available to you'; Figure 6.1a; see Fig 6.2 for explanation of scenario numbers). Looking at the 'think aloud' transcript for the latter it is apparent that there was some confusion, as the respondent is justifying her choice in terms of the need for a good physical environment (rather than the need or preference for a bad physical environment which is really what her choice indicates): *"I have chosen this card because the place I live in is in terms of the house is well kept. I want a house that is good like good roofing, and good place to sleep*". Unfortunately, the transcript for respondent 3's failed consistency check is missing. Despite these cases of individual confusion, the choices made by the respondents were, however, on average, 'rational'.

Lexicographical hierarchical ordering. In general, detail of the respondents' justifications for their choices is lacking in the 'think aloud' transcripts. Only simple reasons are given without reference to or comparison with other choices. It is therefore difficult to assess whether respondents were engaging in lexicographical hierarchical ordering of scenarios.

Satisficing. As stated above, many of the respondents did not give detailed accounts of the reasons for their choices of best and worst scenarios. Although they would give reasons for thinking one scenario was particularly good or bad (and therefore worth ranking as either best or worst), these reasons generally did not extend to comparisons with all, or often even some, of the other scenarios. An example is that from respondent 913, who when responding to the interviewers probe: "*Why is this card* [card 60: 'you are very satisfied with your personal relationships'] *better than the other cards*" gave a reason that did not refer to the other cards: "*Why I have liked most is that I learn about so many things from the different friends that I have*". Another example, this time from respondent 916, is the respondent not expanding her answer when prompted for a comparison with the other scenarios: Interviewer (asking why respondent 916 chose 'You are very satisfied with your personal relationships' as a best scenario): "*What is the advantage of having good personal relationships?* Respondent: "*You depend on each other*" Interviewer: "*How advantageous is what this card states over what the other cards are stating?*" Respondent: "*We depend on each other*". It is therefore possible that the respondents were not considering all of the information thoroughly and as a result that their choices were not maximising their utility, but were rather making choices that satisfied their preferences to some minimal level of utility. Of course, it is possible that such behaviour is a more realistic representation of human economic behaviour, as opposed to behaviour, demanded by RUT, enabling full maximisation of utility, which given its requirements for perfect information and complex computations, could be deemed quite unlikely (§5.4, §5.5.2).

Philosophy of basic value. The limited reasoning recorded in the 'think aloud' transcripts hints that the respondents may have been only able to express values on a small set of topics that are of immediate concern to them; and that the respondents may, therefore, not have innate preferences for the attribute-levels detailed in the choices. The possibility that the respondents were constructing their preferences for the quality of life attribute-states during the exercise needs to be considered when interpreting the results of the main BWS DCE study.

The main additional observation from the transcripts was that, in general, the respondents had some difficulty in completing the best-worst choice task. Interviewers often had to repeat questions and probe for the respondents' reasoning, which often was not forthcoming, and, as noted above, usually did not involve comparison with other scenarios. For illiterate respondents, the interviewer also had to repeatedly read out the quality of life scenario that each card represented, as may be expected. Illiterate respondents may therefore have found the task even more cognitively challenging in that they would have to remember each of the scenarios in order to choose the best and worst of them - this may have reduced their ability to use all of the available information in their choices.

6.3 Final design of the DCE

6.3.1 Content

Rather than try to value the total benefits and costs of the women's groups via a DCE containing a diverse range of attributes of the women's groups (including say, time spent on women's groups activities, money gained from women's group activities, reductions in neonatal mortality and loss of traditional birth culture, see Appendix D) I decided to simplify the task by focusing the DCE directly on areas of quality of life that may be affected by the benefits and costs of the women's groups (see §1.4). Given the main study looking at how the areas of quality of life encapsulated by the WHOQoL-BREF may be affected by women's groups (§4), and cognitive considerations detailed at the beginning of §6.1, the final DCE used the 27 questions of the final Chichewa WHOQoL-BREF (Appendix F, see Appendix E for English version) as attributes, and three (the 'bottom', 'mid' and 'top') levels of the 5-point Likert scales used to answer each question, as the levels of each attribute, as detailed in Figure 6.2. Three levels were chosen in order to simplify the DCE whilst also ensuring an adequate number of levels of each attribute were included so that choices could be distinguished from each other by enough of the attributes being at sufficiently different levels from one another (Farrar et al., 2000). Given the multi-country and inclusive iterative nature of the development of the WHOQoL-BREF (WHO, 1998) (§2.3.1), its use as the content for the DCE helps ensure that the attributes and levels of the DCE that are being valued are reflective of real life and may result in policy-relevant conclusions (Mangham et al., 2009).

Given the 27 attributes and 3 levels, there were a total of 81 attribute-levels that could potentially be shown to each respondent. After considering the maximum number to show to each respondent to ensure respondent efficiency (San Miguel et al., 2008), bearing in mind the results from the pilot study (§6.1-§6.2 above), I decided to show each respondent 7 of the 81 attribute-levels. It was then necessary to keep one quality of life attribute-level the same for all respondents, to act as an anchor for the utility model. Card 76: "always depressed" was chosen as the anchor attribute-level shown to all respondents as it was hypothesised by the study team that, given constant depression can affect all aspects of a person's life, this attribute-level would have the lowest utility.[7] The sets of 6 attribute-levels to show each respondent from the

[7] In the model, as explained in §6.4.1, by specifying the other 80 variables, respectively representing each of the

Figure 6.2: 81 quality of life attribute-levels shown as separate cards (7 per respondent) in BWS DCE

WHOQoL-BREF Q. no.	card no.	Red cards (very bad)	card no.	Yellow cards (moderate)	card no.	Green cards (very good)
1	1	You have a very poor quality of life.	2	Your quality of life is neither poor nor good.	3	You have a very good quality of life.
2	4	You are very dissatisfied with your health.	5	You are neither satisfied nor dissatisfied with your health.	6	You are very satisfied with your health.
3	7	Physical pain prevents you from doing what you need to do by an extreme amount.	8	Physical pain prevents you from doing what you need to do by a moderate amount.	9	You have no physical pain preventing you from doing what you need to do.
4	10	You need medical treatment to function in your daily life an extreme amount.	11	You need medical treatment to function in your daily life a moderate amount.	12	You do not need medical treatment to function in your daily life at all.
5	13	You do not enjoy life at all.	14	You enjoy life a moderate amount.	15	You enjoy life an extreme amount.
6	16	You do not feel your life to be meaningful at all.	17	You feel your life to be moderately meaningful.	18	You feel your life to be extremely meaningful.
7	19	You are not able to concentrate at all.	20	You are able to concentrate moderately well.	21	You are able to concentrate extremely well.
8	22	You do not feel safe at all in your daily life.	23	You feel moderately safe in your daily life.	24	You feel extremely safe in your daily life.
9	25	Your physical environment is not at all healthy.	26	Your physical environment is moderately healthy.	27	Your physical environment is extremely healthy.
10	28	You do not have enough energy for everyday life at all.	29	You have moderately enough energy for everyday life.	30	You have completely enough energy for everyday life.
11	31	You are not able to accept your bodily appearance at all.	32	You are moderately able to accept your bodily appearance.	33	You are completely able to accept your bodily appearance.
12	34	You do not have enough money to meet your needs at all.	35	You have moderately enough money to meet your needs.	36	You have completely enough money to meet your needs.
13	37	The information that you need in your day-to-day life is not available to you at all.	38	The information that you need in your day-to-day life is moderately available to you.	39	The information that you need in your day-to-day life is completely available to you.
14	40	You do not get the opportunity for leisure activities at all.	41	You get moderate opportunity for leisure activities.	42	You get complete opportunity for leisure activities.
15	43	Your ability to get around is very poor.	44	Your ability to get around is neither good nor poor.	45	Your ability to get around is very good.
16	46	You are very dissatisfied with your sleep.	47	You are neither satisfied or dissatisfied with your sleep.	48	You are very satisfied with your sleep.
17	49	You are very dissatisfied with your ability to perform your daily living activities.	50	You are neither satisfied nor dissatisfied with your ability to perform your daily living activities.	51	You are very satisfied with your ability to perform your daily living activities.
18	52	You are very dissatisfied with your capacity for work.	53	You are neither satisfied or dissatisfied with your capacity for work.	54	You are very satisfied with your capacity for work.
19	55	You are very dissatisfied with yourself.	56	You are neither satisfied or dissatisfied with yourself.	57	You are very satisfied with yourself.
20	58	You are very dissatisfied with your personal relationships.	59	You are neither satisfied or dissatisfied with your personal relationships.	60	You are very satisfied with your personal relationships.
21	61	You are very dissatisfied with your sex life.	62	You are neither satisfied or dissatisfied with your sex life.	63	You are very satisfied with your sex life.
22	64	You are very dissatisfied with the support you get from your friends.	65	You are neither satisfied or dissatisfied with the support you get from your friends.	66	You are very satisfied with the support you get from your friends.
23	67	You are very dissatisfied with the conditions of your living place.	68	You are neither satisfied or dissatisfied with the conditions of your living place.	69	You are very satisfied with the conditions of your living place.
24	70	You are very dissatisfied with your access to health services.	71	You are neither satisfied or dissatisfied with your access to health services.	72	You are very satisfied with your access to health services.
25	73	You are very dissatisfied with your transport.	74	You are neither satisfied or dissatisfied with your transport.	75	You are very satisfied with your transport.
26	76	You always have negative feelings such as blue mood, despair, anxiety, depression.	77	You quite often have negative feelings such as blue mood, despair, anxiety, depression.	78	You never have negative feelings such as blue mood, despair, anxiety, depression.
27	79	You do not get enough food to eat at all.	80	You get moderately enough food to eat.	81	You get completely enough food to eat.

remaining 80 were determined mathematically in order to ensure the statistical properties of: orthogonality; level balance; minimal overlap and balanced utilities (Huber and Zwerina, 1996) as far as possible.[8] This was done in Mathematica[9], see Appendix Q on page 407 for the code entered into the software to do this, by ensuring the resulting 180 sets (one for each respondent in each of the three groups of 180 under study, see §4.1.2) of 6 attribute-levels were constrained in the following ways[10]:

1. Each of the 80 varying attribute-levels should be shown the same number of times in total (minimal overlap).

2. Each of the (81*80)/2=3240 unique pairs of attribute-levels should be shown the same number of times as far as possible (minimal overlap).

3. Two attribute-levels from the same attribute should not be shown in the same choice set of 6 attribute-levels (minimal overlap, orthogonality)

4. Within each choice set of 6 attribute-levels the frequency of bottom (red), middle (yellow) and top (green) levels should be as equal as possible (level balance, balanced utilities).

The final 180 sets of 7 attribute-levels (choice sets) shown to respondents are listed in Appendix R on page 416. As shown in this appendix, the 180 choice sets are repeated for each of the three main groups of respondents (women's group members, non-members and controls), so that, in the case of the first two groups (members and non-members) women in the same village are shown the same attribute-levels.

With respect to criterion 1 above, each of the 80 attribute-levels were shown either 13 or 14 times each. With respect to criterion 2 above, 1921/3161 (61%) unique pairs of the 80 cards were contained in all 180 choice sets combined. There were 3161 permitted unique pairs rather than 3240, due to adherence to criterion 3, which meant the exclusion of 79 pairs: those from within the same sets of three - three pairs from each of 27 sets of three equals 81 pairs excluded -; but the two pairs "always depressed" (card 76) and "quite often depressed" (card 77), and "always depressed" (card 76) and "never depressed" (card 78), were allowed because "always depressed" was shown to all respondents. With reference to criterion 4 above, 158/180 choice sets had 2 red, 2 yellow and 2 green cards (apart from card 76 shown to all respondents), and the other 22 sets were only imbalanced as far as having 2, 1, and 3 cards of each colour. The statistical efficiency

other attribute-levels (cards), as dummy variables, and excluding the variable representing "always depressed" (to avoid the 'dummy variable trap'), the unseen 'utility' coefficient for the "always depressed" quality of life attribute-level is implicitly equal to zero; and the coefficients representing the 'utility' of the other 80 attribute-levels are valued in relation to this zero (Bech and Gyrd-Hansen, 2005).

[8] Note that although utility balance (property 4.) was recommended in the recent work detailing efficient design of DCEs used here (Street et al., 2008), it is now no longer always recommended, as although it increases the statistical efficiency of a give sample size, via increasing cognitive complexity - making the choices harder - it reduces respondent efficiency (increases random errors) too much (Viney et al., 2005; Louviere et al., 2011). Given that the utilities of the 81 quality of life states remain unknown due to no previous experimental data existing, it is hoped that balancing the frequency of the levels did not overly balance utilities between the choices and consequently did not overly reduce respondent efficiency in this study. A recent paper by Louviere et al. (2011), discusses the evolving nature of optimal designs for DCE, with respect to underlying assumptions and changes in advice provided by statisticians to applied researchers.

[9] Thanks to my genius brother Greg Colbourn

[10] Although the Mathematica coding was done by Greg Colbourn, I designed the specification

Figure 6.3: Example DCE task presented to a respondent

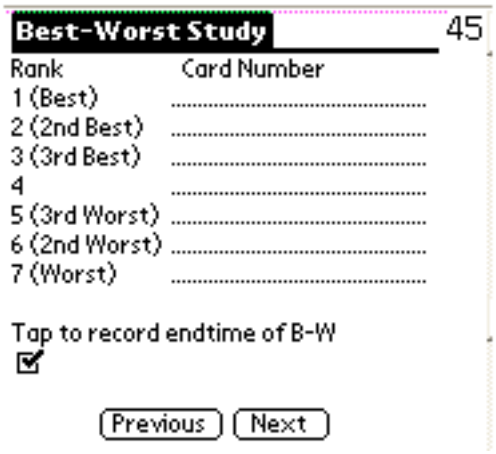
of the design to estimate main effects can be approximated[11] as 61%, the percentage of unique pairs shown. To match the WHOQoL-BREF sample, itself resource-constrained (see §4.1.2), the BWS DCE sample for each study arm was limited to 180 people; each being shown one set of 7 cards (6 attribute-levels and the common 'worst' attribute-level shown to all respondents) in order to maintain respondent efficiency. It is for this reason, and adherence to the four design constraints listed above, that the percentage of unique pairings shown in all 180 choice sets was suboptimal, i.e. less than 100%.

6.3.2 Presentation

The seven attribute-levels presented to each respondent were each shown on separate laminated coloured cards with the colours corresponding to the level of the attribute: bottom=red; middle=yellow; top=green; Figure 6.3.

[11] please note that the complicated nature of this choice experiment, highlighted by the fact that there are an unimaginably large number of ways to make sets of 180 choices each containing 6 different cards from a set of 80: ((80 choose 6) choose 180) $= 5.12 * 10^{1196}$ combinations, has precluded formal assessment of statistical efficiency as recommended and detailed by Street et al. (2008). Indeed, software developed by Street and Burgess for this task, available at: http://crsu.science.uts.edu.au/choice/ , does not currently cater for designs with as many attributes as are in this study.

Figure 6.4: PDA screenshot of recording of DCE results



The choice task, which was thoroughly explained to each respondent before they were asked to complete it, involved respondents first choosing their best and then worst choice quality of life attribute-levels out of the initial 7, the interviewer then removing these and asking the respondent to again choose their best and then worst cards from the remaining 5, the interviewer then removing these and then asking the respondent to choose their best and then worst from the remaining 3 cards. This resulted in a full ranking of the 7 quality of life attribute-levels in the choice set each respondent was presented with. The full procedure for the BWS DCE is provided in Appendix P on page 404 for reference.[12] All respondents who completed the WHOQoL-BREF questionnaire were also asked to complete the BWS DCE straight afterwards. The respondents' sequentially chosen best and worst choice attribute-levels were entered by the interviewer into the relevant PDA form (Figure 6.4), which contained validation rules so that only numbers 1-81 could be entered, the same attribute-level number could not be entered in two different choice fields and attribute-level 76 always had to be entered (as it was shown to all respondents; see Appendix K, page 341)

6.4 Methods of determining a Utility Function

This section details the methods used to construct utility functions(s) representing all of the WHOQoL-BREF quality of life attributes and levels. It begins by detailing the equations used to model the utility function, arriving at those of the Sequential Best-Worst Multi-Nomial Logit (SBWMNL) model, chosen in this study. The preparation of the dataset for estimation of the SBWMNL is then described along with the transformation of the results to a 0 to 1 utility-function scale. Testing for preference heterogeneity, with a focus on that between study arms, is then discussed and described. Finally, this section ends with a brief description of the methods of assessment of interviewer effects, and of choice consistency and the employment of heuristics

[12] This reference is for the pilot study (§ 6.1 on page 141) which involved 10 cards and also placing of stones. The final study procedure which involved 7 cards can be easily extrapolated from this. Note that in these instructions 'scenario' is used instead of the more specific 'quality of life attribute-level'.

by respondents. The following section presents the results. Additional considerations regarding the analysis, that were beyond the scope of this study, are discussed in the final section of the chapter.

All statistical analyses were conducted using Stata 12.1 for Mac (StataCorp, 2011a), see Appendix V for the Stata .do-file code.

6.4.1 Estimating a utility function via extensions to the conditional logit model

In order to model the utility function for the WHOQoL-BREF quality of life attributes and levels, it is necessary to first determine the logistic regression equation. This is the conditional logit model, also known as the multinomial logit (MNL) model, developed by McFadden (1974), that estimates the value each participant attaches to each attribute, based on the choices they made in the BWS DCE. In this study, the equation was arrived at by applying an extension, based on Emily Lancsar's Sequential Best Worst Scaling Multinomial Logit model (Lancsar and Louviere, 2008; Lancsar, 2011), to the standard Rank Ordered Logit model (**rologit** in Stata (StataCorp, 2011a)), as follows:

Recall from §5.2.1 that the total utility individual i gains from choice j is her indirect utility function (IUF):

$$U_{ji} = V_{ji} + \varepsilon_{ji} \tag{6.1}$$

where V_{ji} is the observable (or systematic) component of the IUF (U_{ji}), and ε_{ji} the unobservable (or random) component, based on heterogeneity of tastes and measurement errors, and that:

$$V_{ji} = a_j + \beta_1 x_{j1} + \beta_2 x_{j2} + \ldots + \beta_p x_{jp} \tag{6.2}$$

where x_j are the attributes of choice j; β are the coefficients that quantify the utility attached to each attribute and a_j is the constant associated with the unobserved factors influencing the utility derived from choice j. In the case of this study, the 80 quality of life states that varied in the sets of cards shown to each respondent (see §6.3.1 for explanation) are each represented by an x variable. Of these 80, six were shown to each respondent, as detailed in Appendix R on page 416. The 80 x coefficients were all estimated with respect to the variable representing the *a priori* 'worst' attribute-level "always depressed", which was shown to every respondent, and given it's exclusion from the equation, implicitly set to have a value of zero (Bech and Gyrd-Hansen, 2005), as hypothesised *a priori*. No constant term was included, as is usual in the case of the conditional logit model used (see Equation 6.4 below), the influence of unobserved factors on the utility therefore subsumed in the error term (and not conflated with the omitted "always depressed" attribute-level, as they would be if an intercept term, necessarily representing the omitted category, was included (Bech and Gyrd-Hansen, 2005)). Bearing in mind that the 80 coefficients represent the 27 WHOQoL-BREF quality of life facets each at bottom, medium and top levels (Figure 6.2), minus "always depressed", the formula for the observable component of

the utility function becomes:

$$
\begin{aligned}
V_{ji} \quad = \quad & \beta_1 overallQOL_{bottom} + \beta_2 overallQOL_{mid} + \beta_3 overallQOL_{top} \\
& + \beta_4 health_{bottom} + \beta_5 health_{mid} + + \beta_6 health_{top} \\
& + \beta_7 pain_{bottom} + \beta_8 pain_{mid} + \beta_9 pain_{top} \\
& + \beta_{10} medicine_{bottom} + \beta_{11} medicine_{mid} + \beta_{12} medicine_{top} \\
& + \beta_{13} enjoyment_{bottom} + \beta_{14} enjoyment_{mid} + \beta_{15} enjoyment_{top} \\
& + \beta_{16} lifemeaning_{bottom} + \beta_{17} lifemeaning_{mid} + \beta_{18} lifemeaning_{top} \\
& + \beta_{19} concentration_{bottom} + \beta_{20} concentration_{mid} + \beta_{21} concentration_{top} \\
& + \beta_{22} security_{bottom} + \beta_{23} security_{mid} + \beta_{24} security_{top} \\
& + \beta_{25} envirhealthy_{bottom} + \beta_{26} envirhealthy_{mid} + \beta_{27} envirhealthy_{top} \\
& + \beta_{28} energy_{bottom} + \beta_{29} energy_{mid} + \beta_{30} energy_{top} \\
& + \beta_{31} appearance_{bottom} + \beta_{32} appearance_{mid} + \beta_{33} appearance_{top} \\
& + \beta_{34} money_{bottom} + \beta_{35} money_{mid} + \beta_{36} money_{top} \\
& + \beta_{37} information_{bottom} + \beta_{38} information_{mid} + \beta_{39} information_{top} \\
& + \beta_{40} leisure_{bottom} + \beta_{41} leisure_{mid} + \beta_{42} leisure_{top} \\
& + \beta_{43} mobility_{bottom} + \beta_{44} mobility_{mid} + \beta_{45} mobility_{top} \\
& + \beta_{46} sleep_{bottom} + \beta_{47} sleep_{mid} + \beta_{48} sleep_{top} \\
& + \beta_{49} dailyactivities_{bottom} + \beta_{50} dailyactivities_{mid} + \beta_{51} dailyactivities_{top} \\
& + \beta_{52} workcapacity_{bottom} + \beta_{53} workcapacity_{mid} + \beta_{54} workcapacity_{top} \\
& + \beta_{55} selfsatisfaction_{bottom} + \beta_{56} selfsatisfaction_{mid} + \beta_{57} selfsatisfaction_{top} \\
& + \beta_{58} relationships_{bottom} + \beta_{59} relationships_{mid} + \beta_{60} relationships_{top} \\
& + \beta_{61} sexlife_{bottom} + \beta_{62} sexlife_{mid} + \beta_{63} sexlife_{top} \\
& + \beta_{64} support_{bottom} + \beta_{65} support_{mid} + \beta_{66} support_{top} \\
& + \beta_{67} livingconditions_{bottom} + \beta_{68} livingconditions_{mid} + \beta_{69} livingconditions_{top} \\
& + \beta_{70} healthservaccess_{bottom} + \beta_{71} healthservaccess_{mid} + \beta_{72} healthservaccess_{top} \\
& + \beta_{73} transport_{bottom} + \beta_{74} transport_{mid} + \beta_{75} transport_{top} \\
& + \beta_{77} depression_{mid} + \beta_{78} depression_{top} \\
& + \beta_{79} foodenough_{bottom} + \beta_{80} foodenough_{mid} + \beta_{81} foodenough_{top}
\end{aligned}
\tag{6.3}
$$

where only the 6 βx representing the 6 quality of life attribute-level cards shown to each respondent, in addition to the "always depressed" card shown to all respondents, are included in the equation for that individual. To model the influence of socio-demographic characteristics on the systematic component of the indirect utility function equations 6.2 and 6.3 can be expanded to include $+\delta_1 Z_{i1} + \delta_2 Z_{i2} + ... + \delta_p Z_{ip}$ where each Z_i are personal socio-demographic characteristics of individual i and each δ is a parameter estimating the influence of the socio-demographic

characteristic on the observable component of the indirect utility function (Lancsar and Savage, 2004). For reasons stated in §6.4.4 below, this was not done in this study.

Assuming a model that has linear parameters (including errors) results in a model of the form of Equation 6.1 on page 151. Given that we are seeking to measure utility via discrete choice tasks involving trade-offs rather than a linear scale not involving trade-offs (see §5.1), i.e., broadly speaking, we are asking *which?* rather than *how much?,* this simple regression model is not suitable. Assuming the errors are independently and identically distributed (iid) as random variates whose maxima (extreme values) are approximated by the Gumbel (extreme value type 1) distribution[13] results in McFadden's multinomial logit model (McFadden, 1974) of choice probabilities[14]:

$$P(Y = 1|J) = \frac{e^{uV_{1i}}}{\sum_{j=1}^{n} e^{uV_{ji}}} \tag{6.4}$$

where $Y$is the chosen attribute-level from choice set $j = 1, ..., n$ and where u is a scale parameter inversely proportional to the variance of the error distribution, usually assumed equal to 1 in a single dataset (and therefore left out of the following formulae).[15] V is defined as above in Equation 6.3.

The sequential best-worst multinomial logit model (SBWMNL; (Lancsar and Louviere, 2008; Lancsar, 2011)) uses all of the best and worst choice information by multiplying multinomial logit models representing each of the sequential choices, with observable components of worst choices assumed as being equal to the negative of the observable component of the same (1st, 2nd or 3rd) best choice $[-V]$. For this study, where respondents made 6 separate choices (best from all 7 attribute-levels shown [A out of A, B, C, D, E, F, G] , worst from the remaining 6 [G out of B, C, D, E, F, G], best from the remaining 5 [B out of B, C, D, E, F], worst from the remaining 4 [F out of C, D, E, F], best from the remaining 3 [C out of C, D, E] and worst from the remaining 2 [E out of D, E]), the SBWMNL model for the probability of each individual ranking the 7 attribute-levels in the order that they did is:

$$\begin{aligned} P(ranking\ A,\ B,\ C,\ D,\ E,\ F,\ G) = & \frac{e^{V_{Ai}}}{\sum_{j=A,B,C,D,E,F,G} e^{V_{ji}}} * \frac{e^{-V_{Gi}}}{\sum_{j=B,C,D,E,F,G} e^{-V_{ji}}} \\ & * \frac{e^{V_{Bi}}}{\sum_{j=B,C,D,E,F} e^{V_{ji}}} * \frac{e^{-V_{Fi}}}{\sum_{j=C,D,E,F} e^{-V_{ji}}} * \frac{e^{V_{Ci}}}{\sum_{j=C,D,E} e^{V_{ji}}} * \frac{e^{-V_{Ei}}}{\sum_{j=D,E} e^{-V_{ji}}} \end{aligned} \tag{6.5}$$

This equation is similar to that of the rank-ordered (or exploded) logit (**rologit** in Stata (StataCorp, 2011a)), which instead is the product of sequential positive multinomial logit models each estimating the probability of choosing the best from the remaining choices. The SBWMNL was used to model the choices from the BWS DCE because it better models the sequential

[13] the Gumbel distribution approximates the extreme values of a long, but finite, sequence of random variables and has the functional form $e^{-e^{(x-\mu)/\sigma}}$, where e is the base of the natural logarithm, x is the random variable, and μ and σ are, respectively, the mean and standard deviation of the sequence of random variables.

[14] because the difference between two Gumbel-distributed variables follows a logistic distribution

[15] u is used to evaluate heterogeneity between datasets, such as those for the three arms of this study, as discussed in § 6.4.4 on page 157

best-worst nature of the choice tasks.

The second objective of this study, exploration of the use of BWS and the SBWMNL model for quantifying the results, has therefore been achieved, and is justified by its efficiency of data collection and use relative to other methods that also seek to accurately model preferences via choices (i.e. other MNL models).

6.4.2 Data preparation for model computation

In order to compute the SBWMNL model, using Stata (StataCorp, 2011a), the BWS DCE dataset had to first be 'exploded'. This involved creating 27 rows (observations) for each respondent: the first 7 rows representing all 7 quality of life attribute-levels (cards) shown to the respondent, from which she chose her best one, which was then removed; the next 6 rows representing the 6 remaining cards, from which the respondent chose her worst one, which was then removed; the next 5 rows representing the remaining 5 cards, from which the respondent chose her second best one, which was then removed; the next 4 rows representing the remaining 4 cards, from which the respondent chose her second worst one, which was then removed; the next 3 rows representing the remaining 3 cards, from which the respondent chose her third best one, which was then removed; and, the final 2 rows representing the final two cards, from which the respondent chose her third worst card. The dataset was prepared so that there were 81 columns for each of the quality of life attribute-levels, each being set to have the value 1 when included in the choice sets of 7, 5, and 3 cards, from which the best card was chosen; set to have the value of -1 when included in the choice sets of 6, 4, and 2 cards, from which the worst card was chosen (see previous sentence); and 0 otherwise.[16] Another column then denotes the dependent variable, 'choice', and is coded as 1 for each of the six rows (of the 27 for each respondent, one from each of the six choice sets containing 7, 6, 5, 4, 3 and 2 cards, respectively) containing the chosen card; and 0 otherwise. The final variable (column) required for the model is one to identify each choice set, there being six choice sets for each respondent. The SBWMNL is then estimated as a conditional logit model applied to a dataset 'exploded' in this way, with 'choice' as the dependent variable, the 80 changeable quality of life attribute-levels as independent variables[17], and the data grouped by the choice set identifier variable.[18]

[16] Note that the -1 coding is a key difference of the SBWMNL as compared to the rank-ordered logistic regression model.

[17] note that the "always depressed" attribute-level was not included in the model as it was shown to all respondents (and one variable has to be excluded in order to avoid the dummy variable trap and allow the model to converge). Instead, it was implicitly assumed to have influenced the respondents' choices, meaning that the coefficients representing the choices of the other 80 quality of life attribute-levels can be considered as being relative to the "always depressed" option. Indeed, the "always depressed" card was most often chosen as the worst, both relatively and absolutely, with an average rank (where 7 denotes worst) of 6.4 (data not shown). To illustrate this further, if $x34$, the one negative coefficient in the model excluding $x0$ ("always depressed"), is excluded instead of $x0$, then nearly all coefficients are positive as would be expected given $x34$ was the 'worst'; and $x0$ has an identical coefficient, but with opposite sign, to that of $x34$ in the no-$x0$ model. Similarly, if $x81$ is excluded instead then nearly all coefficients are negative, as $x81$ was one of the 'best' choices; and $x0$ again has an identical coefficient, but with opposite sign, to that of $x81$ in the no-$x0$ model; and so on for different models excluding a different one of the 81 x coefficients.

[18] The code in Stata is: `clogit choice x1-x81, group(idset)` where `choice` is the dependent variable, `x1-x81` represents all of the 80 independent variables and `idset` is the choice-set identifier variable (see Appendix V for further details).

6.4.3 Construction of utility tariff

The results of the choice model can be used to construct a utility tariff to preference-weight the WHOQoL-BREF quality of life scores, collected in the study detailed in §4. It is conceptually useful to calculate such a tariff to be on a 0 to 1 scale, where 0 corresponds to "no utility", and 1, "maximum utility". Such calculation involves converting each of the raw model coefficients to a value on a 0 to 1 scale: zero utility, to full utility corresponding to the maximum levels of all 27 quality of life attributes, the 27 'top-level' x coefficients. This was done by first adding up all of the 27 'top-level' x raw, or exponentiated, or probability (see following paragraph), coefficients and multiplying each one of them by the reciprocal of their total value, so that the 27 of them sum to 1. Following this, each 'bottom-level' (red) and 'mid-level' (yellow) coefficient was rescaled to be in line with it's respective 'top-level' coefficient by multiplying it's raw value by the ratio of it's rescaled 'top-level' coefficient to it's raw 'top-level' coefficient. Note that this procedure is valid because, for each attribute, the coefficients for the 'top' level were always larger than those for the 'mid' level, which were in turn always larger than those for the 'bottom' level (see raw model results in Table 6.2 on page 165). Given that the 2nd and 4th levels of the 5-level, 27 attribute WHOQoL-BREF were not included in the BWS DCE, they were included in the 0 to 1 scale utility tariff by assuming that their values were mid-way between the 'bottom' and 'mid' levels, and 'mid' and 'top' levels, respectively.

The raw coefficients of the SBWMNL model (see Table 6.2 below), given it's nature as a logistic regression model, each represent the log odds that the specific attribute-level was chosen, in this case over the "always depressed" attribute-level, in a binary choice i.e. controlling for all the other attribute-level coefficients (independent variables) in the model (see §6.4.1 above). Note that the log odds, x, are to the base of the natural logarithm e, and also as in Equation 6.4 above, P represents the choice probability:

$$x = \ln\left(\frac{P}{1-P}\right) \tag{6.6}$$

Therefore, in order to construct a utility tariff that is on the ordinary linear additive scale, rather than on the multiplicative log scale, it is necessary to first take the exponent, or anti-log, of each of the model coefficients. The exponent of each x is the odds ratio (OR) denoting the likelihood that it would be chosen, in a binary choice, instead of the base "always depressed" alternative[19]:

$$OR = e^x = \frac{P}{1-P} \tag{6.7}$$

The probability, P, that an attribute would be chosen instead of the base "always depressed" alternative in a binary choice, can also be computed from the raw log odds model coefficient, x, by algebraically manipulating Equation 6.7 to become:

[19] given that the base alternative is set to have a log odds of 0 and therefore, as $e^0 = 1$, an odds of 1 (see §6.3.1), the odds ratio denoting the likelihood of x being chosen over the base alternative is the same as the odds because it is a division of the latter by 1.

$$P = \frac{e^x}{1 + e^x} \tag{6.8}$$

Here, given that anything less than a 50% probability in a binary choice indicates that the specific x attribute-level is worse (less likely to be chosen) than the base "always depressed" alternative, which, given the model specification, has a log odds of zero and therefore an odds ratio of 1, the probability of the base "always depressed" option, necessarily omitted from the model, should be set to 0.5; given that Equation 6.8 becomes:

$$P = \frac{e^0}{1 + e^0} = \frac{1}{1 + 1} = 0.5$$

Either odds ratios, or probabilities, can, therefore, be used to construct a utility tariff on an additive 0 to 1 scale, employing the method detailed in the first paragraph of this section, above. Using the odds ratios results in a tariff dominated by the few 'top'-level x variables with very high odds ratios, and relatively little variation in utility between the 'bottom-level' and 'mid-level' x variables representing each quality of life attribute. Using the latter results in a utility tariff with little variation between all of the 'mid-' and 'top-level' x variables, given that, when converted to probabilities, all of the 'mid-level' ones are typically above 90% and all 'top-level' ones are at or above 97% (data not shown). Therefore, in order to avoid either of these oppositely highly-skewed utility tariffs, it is perhaps better to return to a tariff constructed using the raw log odds coefficients, as even despite the fact it will be on an exponential scale, it is far less skewed either at the 'bottom' or 'top' quality of life attribute-levels. (See Appendix S for visual representations of utility tariffs constructed from the raw log odds model coefficients, the exponentiated odds ratio coefficients and the exponentiated probability coefficients, respectively, for comparison.)

The above process, whichever type of coefficients are used, resulted in all 5 levels of all 27 attributes having a BWS-DCE-preference-based 'utility' value. The 27 row, 5 column matrix containing these values was then used to calculate a person's utility by adding the 27 utility values corresponding to the level of each of the 27 attributes the respondent stated they had experienced, in the last 2 weeks, when completing the WHOQoL-BREF questionnaire (see §4). If a respondent stated they had experienced 'top' levels (coded 5) of all 27 attributes they would score the highest utility possible on the scale, a score of 1. Lower values for some, or all, of the 27 attributes would, accordingly, correspond to lower utility scores. Given that the scoring is relative to "always depressed" (the 'bottom' level of q26 depressed), which was set at 0, assuming data for all of the 27 questions (attributes), the lowest score possible would be the sum of the utility values of all of the 27 'bottom' levels.

This utility tariff is a simplification for two main reasons. Firstly, only the means of the coefficients of the choice model, and not the statistical uncertainty surrounding them, were used in the calculations.[20] Secondly, two-factor, and more-complex, interactions between the coefficients representing different quality of life levels and attributes were not modelled (due to the complex DCE design -see §6.3.1- precluding sufficient sample size to estimate such interactions

[20] nearly all model coefficients, were, however, $p<0.05$ statistically significant, see §6.5 below

with enough power), hence each of the utility values on the 0-1 scale are independent of each other. In addition, there are perhaps other aspects of quality of life that affect a person's utility that were not included in the model. Nevertheless, the 0 to 1 utility score tariff, constructed in this study as described above, is an improvement on the simple weighting, recommended by the WHO, obtained by the rating of the importance of each of the 27 attributes on a 1-5 scale, without choosing between them (trading them off against each other), see §6.5.4.

6.4.4 Testing for heterogeneity of preferences between study arms

When modelling utility functions, in addition to the theoretical concerns surrounding human capability and bounded rationality (§5.5.2, I return to this later in §6.6), differences between peoples preferences need to be considered. Preference heterogeneity can be assessed by either top down or bottom up modelling approaches. In a top down approach, heterogeneity of choice preferences between study arms would first need to be assessed. Following this, either the separate models for each study arm (if they were found to be heterogeneous), or the pool model containing data from all study arms (if they were not), would then have socio-demographic covariates added to them as either interactions with attributes or as alternative specific constants. Such approaches require making assumptions about the distributions of the differences in utility (preferences) given differences in the covariates (Lancsar and Louviere, 2008). In this study, after finding the three study arms to have heterogeneous preferences (as explained in the following paragraph), I did not then attempt to assess heterogeneity dependent on various socio-demographic variables. This was because the small sample sizes within each group (n=180) precluded there being sufficient numbers in each socio-demographic category for adequate statistical precision.[21] The bottom-up approach is to create models for each individual. This has become possible with sequential best-worst discrete choice experiments, which gather more information from each choice task, without too much additional cognitive burden (Louviere et al., 2008), by asking respondents to provide a full-ranking of the attributes in each choice set by sequentially choosing the best and worst without replacement until all options are ordered (Lancsar and Louviere, 2008; Lancsar, 2011). My study has taken such an experimental approach. However, by only showing respondents one profile of 7 quality of life attribute-levels each (rather than many such profiles, this was done due to ensure respondent efficiency[22]), there is not enough data on the preferences of each individual to create sufficiently accurate and stable individual level models. Therefore I rely on a top-down approach to investigate preference heterogeneity.

In order to test for heterogeneity of preferences between the three study arms it is necessary to compare the sum of the log likelihoods of the models for each arm ($L_1 + L_2 + L_3$), with the highest log likelihood of all pooled models containing the datasets from each of the study arms, each dataset scaled to accurately represent scale differences between the coefficients (L_μ) (Swait

[21] This resolution was made in light of the inconclusive results from the contingent valuation study (§7), due to small sample sizes for each category; the analyses of the contingent valuation study being undertaken before those of this chapter.

[22] given the unfamiliarity of the task - see §6.1 on the piloting. It was also important to ensure respondent efficiency on the other parts of the study - the WHOQoL-BREF (§4) and the Contingent Valuation study (§7), therefore I did not want to overload the respondents with more than one choice set of 7 cards.

and Louviere, 1993). In brief explanation, because μ, the parameter representing heterogeneity in scale, can't be directly identified independently of the choice parameters β, it is necessary to estimate $\mu\beta$, via a 'grid search' (see below) in order to first compare the β of the models from each study arm. If these are statistically equal, that is, the hypothesis $H_{1A} : \beta_1 = \beta_2 = \beta_3$ is accepted, it is then necessary to compare the μ between the datasets for each of the three study arms in a further test, i.e. test the hypothesis $H_{1B} : \mu_1 = \mu_2 = \mu_3$ (Swait and Louviere, 1993; Viney et al., 2005). The likelihood ratio test statistic for H_{1A} is computed as $-2(L_\mu - (L_1 + L_2 + L_3))$. A 'grid-search' (Swait and Louviere, 1993; Louviere et al., 2000; Viney et al., 2005) is required to estimate L_μ, the log likelihood of the scaled pooled model. This involves comparing the log likelihoods of pooled-dataset models each estimated using the three datasets scaled slightly differently; the goal of the grid search being the identification of the scaled pooled model with the maximum (least negative) log likelihood. The results of these tests of heterogeneity are detailed in §6.5.2.

6.4.5 Investigating choice consistency, heuristics and interviewer effects

The models discussed above in §6.4.1-§6.4.4 are all concerned with probabilistic estimation of utility. They are therefore not appropriate for modelling deterministic or lexicographical preferences, which by their nature do not involve compensatory (trading) behaviour, and in such situations either do not converge or produce unstable very large or very small (i.e. completely unrealistic) estimates. As discussed earlier (§5.5.2), although such preferences violate random utility theory (RUT, the basis for the above models), they can not be considered irrational. Therefore, it is perhaps better to not exclude such inconsistent responses from the model (Ryan et al., 2009); in this study no such inconsistent responses were excluded.

The uncertainty surrounding the estimates, and whether the models converge to begin with, were examined in order to assess the presence of deterministic or lexicographical preferences (see §6.5.3). Quantitative visual assessments were also undertaken on the two consistency checks (red-'bottom-level' better than green-'top-level') as detailed in the footnote to i) in Table 5.1 on page 133, and were planned to investigate the 'Take The Best' heuristic as detailed in the footnote to iii) in Table 5.1. The fact that each respondent was only shown 7 out of 81 quality of life attribute-levels, and in only one profile (choice set), however, precluded the investigation of such deterministic or lexicographic preferences for each quality of life state. The other main cause of instability in probabilistic models is collinearity, which can be avoided by employing a statistically efficient experimental design, such as the one adopted in this experiment (§6.3.1), to the resource-constrained sample size used.

Potential interviewer effects were assessed visually, in relation to best-worst ranking by the level of the attribute (colour of the card: 'bottom'-red; 'mid'-yellow; and 'top'-green). More formal regression analyses to investigate interviewer effects were not undertaken. This was due to both the large number of coefficients in the model, and the estimation of separate models for each of the three study arms, meaning that the estimation of interaction terms for each of the 5 categories of interviewer (one for each) with each of the 80 coefficients was not possible at an

adequate level of statistical precision.

6.5 Results

All 534 women who completed the WHOQoL-BREF also completed the BWS DCE.[23] In this section, results are presented showing choice consistency given varying experimental conditions, and the results of the SBWMNL choice models and consequent utility tariffs for each study arm. The model estimates are first compared to those derived from the simple alternative method of using a rating scale, and found to be superior. For each study arm, the utility tariff derived from the model was then used to compute average preference-weighted quality of life domain and attribute scores. These measures, which are justified as being more descriptive of the quality of life of respondents from each study arm than the unweighted WHOQoL-BREF scores explored in §4, were then used to highlight differences in quality of life between the respondents of each study arm. Although in many cases, such differences remain ambiguous, it is hoped that the material in this section provides a useful exposition of the potential of using DCE to preference-weight quality of life scores in order to measure quality of life from a holistic perspective for the purposes of economic evaluation of interventions.

6.5.1 Choice consistency, heuristics and interviewer effects

Respondents were generally given two top-level 'very good' attributes (green cards), two mid-level 'neither good nor bad' (yellow cards) and two bottom-level 'very bad' (red cards) to choose between in addition to what was thought to be the worst attribute-level (card 76, "always depressed"; see §6.3, and Appendix R on page 416 for choice sets presented to each respondent). Figures 6.5 and 6.6 visually represent the choices of respondents by level of quality of life attribute (green=top, yellow=mid, red=bottom; see § 6.3.1 on page 146), in chronological order, and by interviewer (each in chronological order), respectively. Each row is a respondent and their choices from best to worst go from right to left; separate colour blocks should be read from left to right before going down to the next row of blocks. From both figures it is apparent that although there is a broad consensus of top-level (green) cards being ranked higher than middle-level (yellow) cards, being ranked higher than bottom-level (red) cards, there is still a lot of variation in the data as might be expected - especially considering the mid-level of some quality of life attributes may be considered better than other attributes at the top-level or worse than some attributes at the bottom level - see § 6.1 on page 141. It can also be seen that in some cases (for 45 separate respondents a total of 60 times) bottom-level attributes have been ranked above one or more top-level attributes, such ranking more indicative of an 'irrational preference' (see Table 5.1 on page 133). Looking at the pattern in chronological order it is interesting to note that more of these possible 'irrational' responses occurred near the beginning (1st one-and-a-bit blocks: 12 respondents, 20 times) and at the end (last two blocks including small block: 10 respondents, 15 times), and also that during a period near the beginning it appears that the respondents may

[23] see Table 4.1 on page 88 for socio-demographic characteristics of the respondents.

perhaps have been more prompted by the interviewers to rank green>yellow>red (the third block on the first row of blocks, Figure 6.5).

Looking at Figure 6.6 on page 162 it appears that some interviewers may have been more likely than others to yield 'irrational' responses among their respondents. Interviewer 4 had 12 respondents out of 27 make a total of 20 'irrational' choices, and interviewer 2 had 25 respondents out of 190 make a total of 31 'irrational' choices; whereas for interviewer 3 only 1 'irrational' choice was made from 106 respondents, for interviewer 5 no 'irrational' choices were made from 21 respondents, and for interviewer 1 only 7 respondents out of 190 made a total of 8 'irrational' choices. Figure 6.6 also shows that some interviewers may have been more likely to prompt green>yellow>red ranking: for example, interviewers 3 and 5, and interviewer 2 in their middle period; note most of the 'irrational' choices interviewer 2's respondents made were near the beginning (early April 2011) or end (late May / early June 2011) of their interviewing period. Although these differences have not been statistically tested, it is qualitatively clear that there were differences in the way the respondents chose between attribute-levels based on their level (colour of the card), both associated with the interviewer, and the period of the study.

Overall, although it is possible that the different combinations of quality of life attribute-levels would produce such rankings unprompted, this visual evidence suggests the understanding of the task may have been affected by the way the interviewers explained the task to the respondents, which may also have varied over time. Given the unfamiliar nature and difficulty of the task (see §6.1 and §6.2), and the fact that many of the respondents were illiterate (of the 106 respondents who also took part in the CV study, 38% were illiterate and a further 10% semi-literate - see Table 7.2 on page 193), this is perhaps not surprising. This caveat should be born in mind (along with those concerned with bounded rationality (§5.5.2) and critiques of utilitarianism (§2.1.3-2.1.5) when interpreting the results of the choice modelling that follow.

6.5.2 Preference heterogeneity

Table 6.1 details the results of the hypothesis tests of differences in choice parameters (β) and scale (μ) between the three study arms (see §6.4.4 for explanation). The 'grid search' detailed in §6.4.4 resulted in a scaled pooled model where, relative to the arm 1 dataset[24], the dataset for arm 2 was scaled by 1.0753(= 1/0.93) and the dataset for arm 3 was scaled by 1.1111(= 1/0.9). The log likelihood of this model, which was higher than all others tested in the grid search[25], was $L_\mu = -2808.90$. The log likelihoods of the SBWMNL models for each of the three study arms were $L_1 = -948.49$, $L_2 = -867.27$, $L_3 = -891.31$. Therefore, the likelihood ratio test statistic for testing H_{1A} was $-2(-2808.90 - (-948.49 - 867.27 - 891.31)) = 203.68$, as shown in Table 6.1. Given each of the four models being compared has 80 β parameters (see Equation 6.3 above), and, given we are comparing three datasets and therefore used two additional μ scale parameters in our grid search and scaled pooled model, the test statistic should be evaluated with

[24] the arm 1 dataset was used as the base, with scale=1, because it has the lowest scale - the coefficients from the arm 1 model have the highest standard errors on average (data not shown)

[25] The grid search involved comparing the log likelihoods of scaled pooled models with the scales of arms 2 and 3 separately ranging from 0.1 to 10 relative to arm 1 with a scale of 1; the same range of scale differences for arm 1 and 3 vs. arm 2 with a constant scale of 1; and again arms 1 and 2 vs. arm 3.

Figure 6.5: Visualisation of choices by attribute level: Chronological order (25/01/2011 - 03/06/2011)

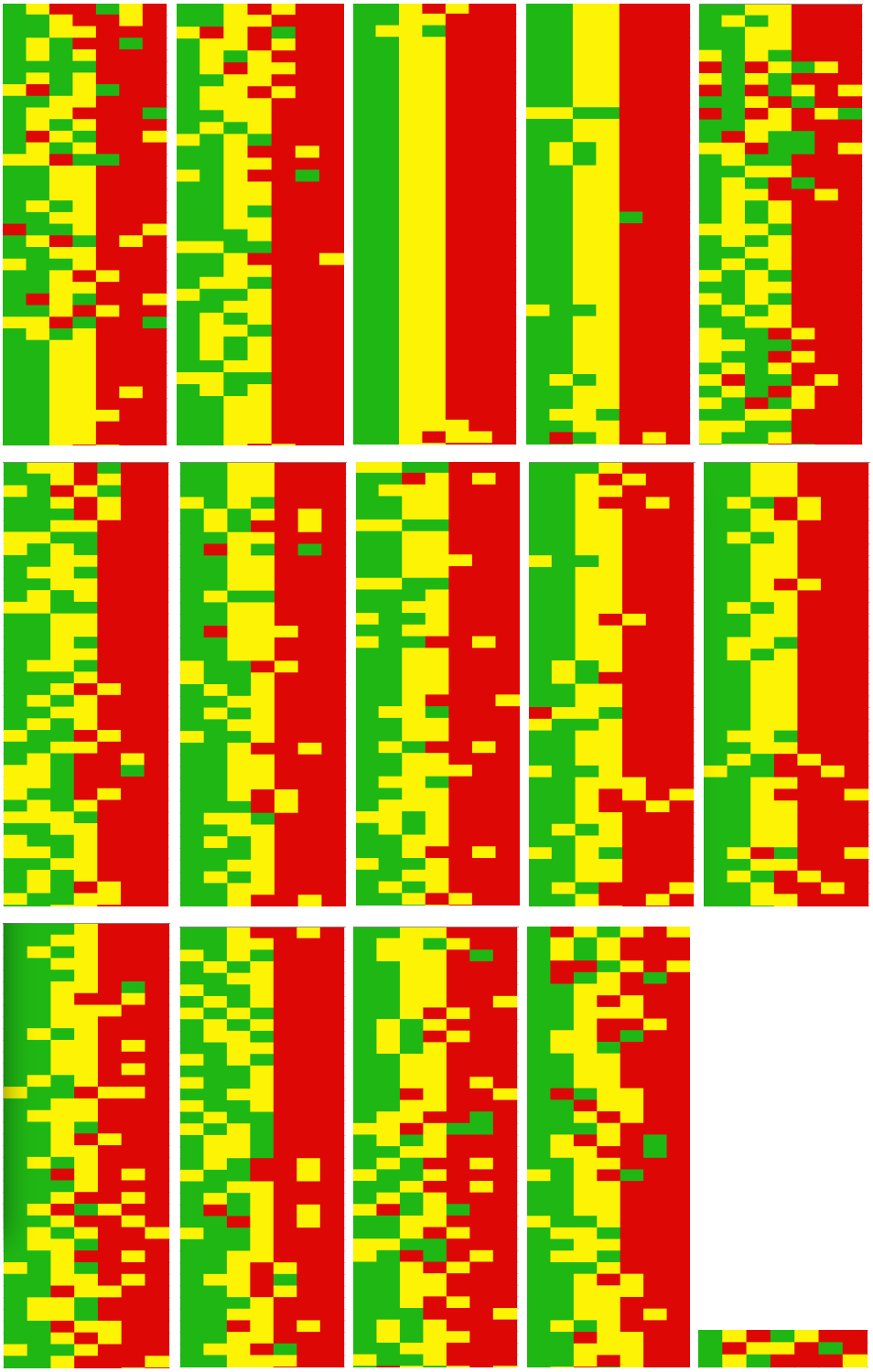


Figure 6.6: Visualisation of choices by attribute level: By interviewer, each in chronological order

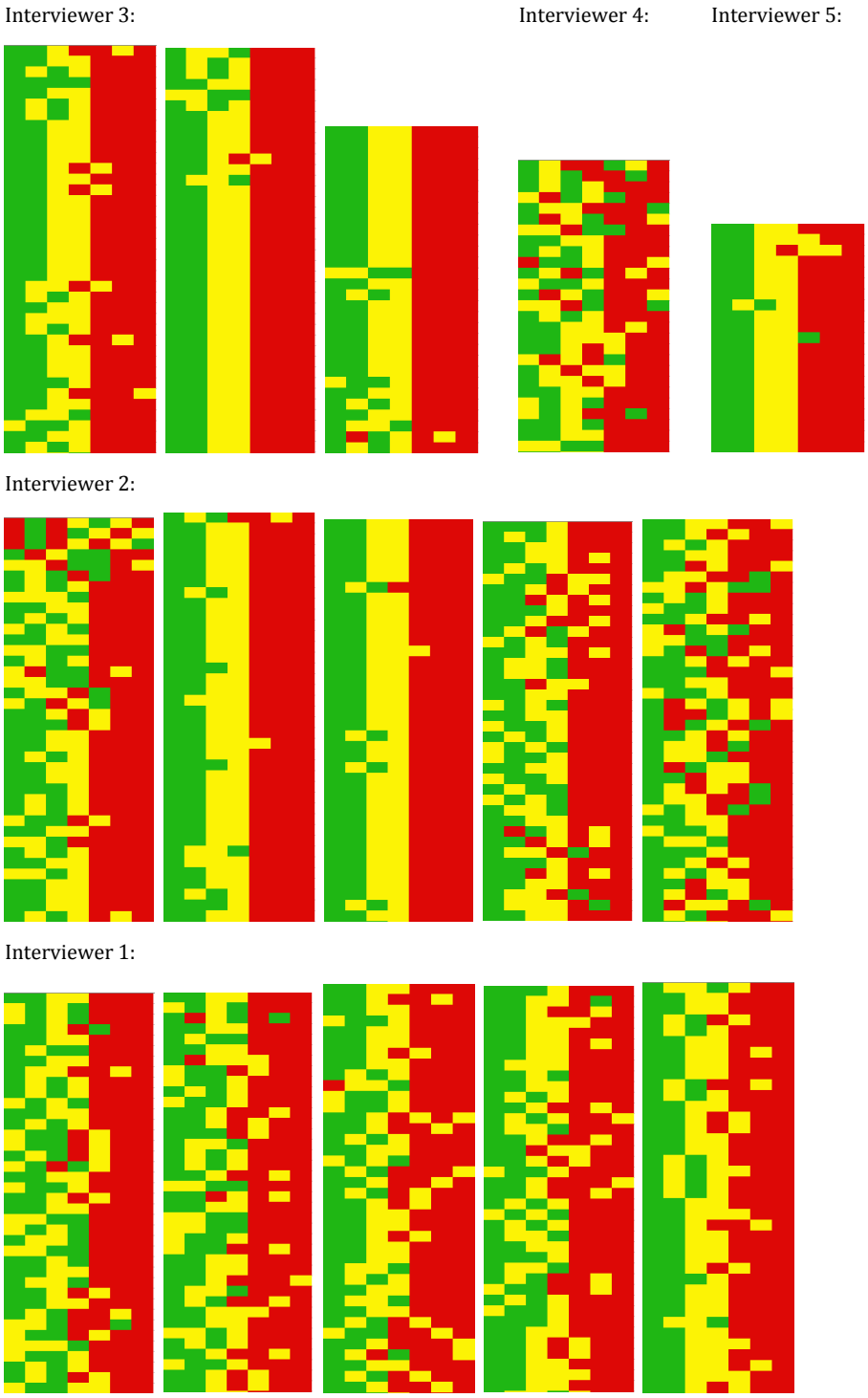


Table 6.1: Results of hypothesis tests of heterogeneity between study arms

Hypothesis	Likelihood ratio test	Test statistic	Degrees of freedom	χ^2 critical value (95%, two-tailed)	Result
$H_{1A}: \beta_1 = \beta_2 = \beta_3$	$-2(L_\mu - (L_1 + L_2 + L_3))$	203.68	82	108.94	Reject H_{1A}
$H_{1B}: \mu_1 = \mu_2 = \mu_3$	$-2(L_\mu - L_p)$	cannot be tested because H_{1A} rejected			

L_μ is the value of the log likelihood function for the scaled, pooled model. L_1, L_2 and L_3 are the values of the log likelihood functions for the separate models for each study arm.
L_p is the value of the log likelihood function for the simple pooled model (data for all study arms pooled together without separately scaling the data for each study arm).
This table is adapted from the one used by Viney et al. (2005)

82 degrees of freedom (Swait and Louviere, 1993). As the critical value for the χ^2 distribution at 95% probability (two-tailed) and 82 degrees of freedom is 108.94, the (much) higher value of the test statistic means we should reject H_{1A} (Table 6.1) and conclude that the sets of 80 β parameters for each study arm, are different; i.e. that there is preference heterogeneity between the three study arms. Despite this result, it could have still been possible that two of the three arms had statistically indistinguishable scales and could still have been pooled. To test this, one-dimensional grid searches were undertaken whereby the scale of one arm was varied and compared to the other two, which were kept constant, and the maximum log likelihood of such scaled pooled models searched for and tested with reference to the log likelihood of the single arm models, as detailed in §6.4.4 for the two-dimensional grid search. This process yielded a similar test statistic (204.69) also rejecting the $H_{1A}: \beta_1 = \beta_2 = \beta_3$ scale-homogeneity hypothesis. Given these results, it was necessary to estimate separate utility functions for each study arm.

In addition to investigating preference heterogeneity in the full SBWMNL model it is also useful to investigate whether scale differs between arms, over the depth of the best-worst questions, i.e. whether there is higher error variance linked to later choices in the sequence (personal communication, Emily Lancsar, May 2012). To do this, conditional logit models (see Equation 6.4 ; **clogit** in Stata) were run using only the first-best-choice data, that is, the first best choice from the 7 attribute-levels shown, only (7 observations only per respondent, cf. §6.4.2). Comparing these simplified models for each arm using the 'grid search' method described in §6.4.4, yielded the same result of rejection of $H_{1A}: \beta_1 = \beta_2 = \beta_3$ and the conclusion of preference heterogeneity, meaning that scale (error variance) does not appear to vary between arms throughout the depth of the best-worst questions.

6.5.3 SBWMNL results and Utility Tariffs for each study arm

Table 6.2 presents the results of the SBWMNL choice models for each of the three study arms. All 80 β coefficients for all 80 choice (x) variables representing each of the quality of life attribute-levels (see Equation 6.3), and their p-values and 95% confidence intervals (significance denoted by stars), are presented in three columns (two on the first page and one on the second page). From Table 6.2, it is apparent that all of the coefficients are positive, except those for $x34$ ($money_{bottom}$) for the women's group arm (arm 1), and $x4$ ($health_{bottom}$) and $x34$

($money_{bottom}$) for the non-members arm (arm 2); these quality of life attribute-levels, therefore, being considered as worse than the "always depressed" attribute-level ($x0$: $depression_{bottom}$) shown to all respondents (assumed to have a coefficient of 0 as all the other 80 are relative to it), although they are only $p = 0.104$, $p = 0.092$ and $p = 0.087$ significant, respectively. All other attributes, with positive signs are therefore considered better than "always depressed" with the magnitude of the coefficient indicating by how much, on the log odds scale. Table 6.2 also shows that the vast majority of the coefficients are statistically significant at p<0.05 level (most with much lower p-values), with only 12 of the 80 coefficients *not* $p < 0.05$ significant for the women's group arm ($x4$: $health_{bottom}$, $x7$: $pain_{bottom}$, $x10$: $medicine_{bottom}$, $x22$: $security_{bottom}$, $x25$: $envirhealthy_{bottom}$, $x28$: $energy_{bottom}$, $x31$: $apperance_{bottom}$, $x34$: $money_{bottom}$, $x43$: $mobility_{bottom}$, $x58$: $relationships_{bottom}$, $x64$: $support_{bottom}$, $x79$: $foodenough_{bottom}$); only 7 of the 80 coefficients *not* $p < 0.05$ significant for the non-members arm ($x1$: $overallQoL_{bottom}$, $x4$: $health_{bottom}$, $x7$: $pain_{bottom}$, $x22$: $security_{bottom}$, $x34$: $money_{bottom}$, $x37$: $information_{bottom}$, $x70$: $healthservaccess_{bottom}$); and only 5 of the 80 coefficients *not* $p < 0.05$ significant for the control arm ($x13$: $enjoyment_{bottom}$, $x40$: $leisure_{bottom}$, $x43$: $mobility_{bottom}$, $x70$: $healthservaccess_{bottom}$, $x79$: $foodenough_{bottom}$). It is interesting to note that all of the statistically insignificant coefficients are for bottom-levels of quality of life attributes. Perhaps this is due to the respondents finding it more difficult to choose between the base "always depressed" attribute-level, which is also 'bottom'-level, and these other bottom-levels of quality of life attributes. There is some overlap between the not significant coefficients between the three study arms. The fact that most of the coefficients are significant (and the three models each converge to begin with) provides evidence of trading behaviour supportive of RUT (see §6.4.5).

Although, for the majority of the 80 quality of life attribute-level variables, there is overlap between the confidence intervals surrounding the coefficients for each arm (Table 6.2), as a whole, all 80 of the coefficients were found to be statistically different between each of the three study arms, as determined by the investigations detailed in §6.5.2. This is perhaps unsurprising given that 80 different coefficients were being compared, and that we cannot expect different groups of people to have the same average preferences for all of them with respect to the base "always depressed" attribute-level. Nevertheless, the observation of such differences is interesting, as it prompts questions of what it is about each study arm that causes the specific differences in how the attribute-levels are valued by the respondents within them. Although the investigation of such factors is beyond the scope of this study due to lack of provision for such follow-up research, awareness of the likelihood of their existence is important for interpretation of the observed differences in preference-weighted quality of life scores presented below in §6.5.5.

Table 6.2: SBWMNL choice model results

		SBWMNL choice models for each study arm		
		(1)	(2)	(3)
		wg	non	control
VARIABLES	LABELS	choice	choice	choice
x1	overallQoLbottom	1.040*	0.339	1.605***
		(0.0130)	(0.442)	(0.000282)
		0.219 - 1.861	-0.524 - 1.202	0.739 - 2.471
x2	overallQoLmid	3.779***	3.135***	3.112***
		(0)	(0)	(8.30e-11)
		2.911 - 4.648	2.262 - 4.007	2.173 - 4.051
x3	overallQoLtop	4.112***	5.813***	6.089***
		(0)	(0)	(0)
		3.203 - 5.020	4.797 - 6.829	5.042 - 7.135
x4	healthbottom	0.0898	-0.893	1.648***
		(0.843)	(0.0919)	(0.000130)
		-0.800 - 0.980	-1.931 - 0.145	0.804 - 2.493
x5	healthmid	2.343***	3.694***	3.908***
		(4.83e-09)	(3.07e-10)	(0)
		1.559 - 3.128	2.544 - 4.844	3.008 - 4.808
x6	healthtop	5.113***	6.309***	5.874***
		(0)	(0)	(0)
		4.132 - 6.093	5.214 - 7.404	4.845 - 6.903
x7	painbottom	0.00424	0.531	1.395**
		(0.992)	(0.238)	(0.00208)
		-0.849 - 0.857	-0.351 - 1.413	0.507 - 2.282
x8	painmid	3.609***	3.849***	2.563***
		(0)	(0)	(1.38e-08)
		2.700 - 4.519	3.039 - 4.659	1.678 - 3.449
x9	paintop	4.259***	4.545***	4.971***
		(0)	(0)	(0)
		3.347 - 5.171	3.626 - 5.464	4.019 - 5.922
x10	medicinebottom	0.734	2.637***	1.186*
		(0.110)	(2.95e-08)	(0.0157)
		-0.167 - 1.634	1.705 - 3.570	0.224 - 2.148
x11	medicinemid	3.413***	4.383***	3.183***
		(0)	(0)	(0)
		2.457 - 4.369	3.541 - 5.224	2.272 - 4.094
x12	medicinetop	3.597***	4.712***	3.997***
		(0)	(0)	(0)
		2.742 - 4.452	3.798 - 5.627	2.989 - 5.005
x13	enjoymentbottom	1.193**	1.484**	0.776
		(0.00504)	(0.00100)	(0.0903)
		0.359 - 2.027	0.600 - 2.368	-0.122 - 1.673
	2			
x14	enjoymentmid	2.474***	4.008***	4.089***
		(1.41e-08)	(0)	(0)
		1.619 - 3.328	3.132 - 4.884	3.167 - 5.012
x15	enjoymenttop	5.633***	6.261***	6.052***
		(0)	(0)	(0)
		4.573 - 6.694	5.180 - 7.343	4.943 - 7.161
x16	lifemeaningbottom	0.895*	1.814***	1.417***
		(0.0437)	(1.61e-05)	(0.000985)
		0.0253 - 1.764	0.990 - 2.638	0.574 - 2.260
x17	lifemeaningmid	2.856***	3.134***	4.247***
		(2.37e-10)	(0)	(0)
		1.972 - 3.739	2.242 - 4.026	3.353 - 5.141
x18	lifemeaningtop	4.794***	4.744***	4.621***
		(0)	(0)	(0)
		3.742 - 5.846	3.847 - 5.642	3.674 - 5.569
x19	concentrationbottom	1.456***	1.619***	1.299**
		(0.000548)	(0.000233)	(0.00293)
		0.630 - 2.282	0.757 - 2.481	0.443 - 2.155
x20	concentrationmid	3.779***	4.207***	4.203***
		(0)	(0)	(0)
		2.925 - 4.633	3.286 - 5.128	3.294 - 5.112
x21	concentrationtop	4.378***	4.716***	4.889***
		(0)	(0)	(0)
		3.485 - 5.270	3.787 - 5.644	3.944 - 5.834
x22	securitybottom	0.781	0.388	1.218**
		(0.0642)	(0.383)	(0.00764)
		-0.0460 - 1.609	-0.484 - 1.261	0.323 - 2.113
x23	securitymid	3.098***	2.825***	3.734***
		(0)	(2.46e-10)	(0)
		2.260 - 3.936	1.950 - 3.699	2.841 - 4.626
x24	securitytop	5.069***	5.070***	6.412***
		(0)	(0)	(0)
		4.123 - 6.015	4.114 - 6.025	5.269 - 7.556
x25	envirhealthybottom	0.288	1.639***	1.317**
		(0.492)	(0.000252)	(0.00238)
		-0.534 - 1.111	0.762 - 2.517	0.468 - 2.167
x26	envirhealthymid	2.940***	3.948***	2.921***
		(0)	(0)	(2.08e-10)
		2.067 - 3.813	3.102 - 4.795	2.020 - 3.821
x27	envirhealthytop	4.610***	4.619***	6.142***
		(0)	(0)	(0)
		3.685 - 5.535	3.651 - 5.586	5.042 - 7.242
x28	energybottom	0.666	0.983*	1.135**
		(0.0908)	(0.0288)	(0.00911)
		-0.106 - 1.438	0.102 - 1.865	0.282 - 1.987
x29	energymid	3.650***	3.271***	3.657***
		(0)	(0)	(0)
		2.781 - 4.519	2.374 - 4.168	2.748 - 4.566
x30	energytop	5.916***	5.554***	5.705***
		(0)	(0)	(0)
		4.708 - 7.125	4.532 - 6.575	4.690 - 6.719
x31	appearancebottom	0.828	1.328**	1.763***
		(0.0603)	(0.00290)	(0.000132)
		-0.0360 - 1.693	0.454 - 2.202	0.859 - 2.667
x32	appearancemid	2.977***	3.371***	3.760***
		(0)	(0)	(0)
		2.097 - 3.857	2.403 - 4.340	2.902 - 4.619
x33	appearancetop	4.158***	4.736***	5.501***
		(0)	(0)	(0)
		3.271 - 5.044	3.793 - 5.680	4.514 - 6.488
x34	moneybottom	-0.350	-0.890	1.091*
		(0.451)	(0.0875)	(0.0175)
		-1.261 - 0.560	-1.911 - 0.131	0.191 - 1.990
x35	moneymid	4.042***	3.166***	3.731***
		(0)	(5.03e-11)	(0)
		3.126 - 4.958	2.221 - 4.110	2.840 - 4.623
x36	moneytop	4.320***	4.116***	4.190***
		(0)	(0)	(0)
		3.353 - 5.287	3.178 - 5.054	3.309 - 5.071
x37	informationbottom	0.878*	0.761	1.652***
		(0.0441)	(0.0926)	(0.000260)
		0.0230 - 1.732	-0.126 - 1.647	0.766 - 2.539
x38	informationmid	3.391***	4.677***	4.294***
		(0)	(0)	(0)
		2.506 - 4.276	3.791 - 5.563	3.386 - 5.203
x39	informationtop	4.899***	6.223***	5.973***
		(0)	(0)	(0)
		3.936 - 5.861	5.071 - 7.375	4.925 - 7.021
x40	leisurebottom	0.893*	1.184**	0.342
		(0.0305)	(0.00539)	(0.446)
		0.0839 - 1.701	0.350 - 2.018	-0.537 - 1.221
x41	leisuremid	3.733***	3.519***	3.824***
		(0)	(0)	(0)
		2.852 - 4.614	2.578 - 4.461	2.962 - 4.685
x42	leisuretop	4.435***	5.186***	5.483***
		(0)	(0)	(0)
		3.569 - 5.302	4.261 - 6.111	4.527 - 6.438
x43	mobilitybottom	0.680	0.957*	0.601
		(0.122)	(0.0387)	(0.128)
		-0.181 - 1.541	0.0496 - 1.865	-0.172 - 1.375
x44	mobilitymid	2.777***	2.877***	3.173***
		(0)	(1.04e-10)	(0)
		1.976 - 3.578	2.004 - 3.749	2.269 - 4.078
x45	mobilitytop	3.737***	3.943***	5.005***
		(0)	(0)	(0)
		2.829 - 4.646	3.073 - 4.812	4.105 - 5.904
x46	sleepbottom	1.605***	1.530***	1.119**
		(9.59e-05)	(0.000499)	(0.00763)
		0.799 - 2.412	0.669 - 2.391	0.297 - 1.942
x47	sleepmid	2.372***	3.138***	3.177***
		(3.19e-08)	(0)	(0)
		1.531 - 3.213	2.221 - 4.055	2.292 - 4.062
x48	sleeptop	3.854***	5.484***	4.958***
		(0)	(0)	(0)
		3.003 - 4.705	4.521 - 6.447	4.087 - 5.829
x49	dailyactivitiesbottom	0.873*	1.832***	1.234**
		(0.0480)	(3.35e-05)	(0.00405)
		0.00785 - 1.737	0.966 - 2.697	0.393 - 2.076
x50	dailyactivitiesmid	3.637***	3.485***	2.642***
		(0)	(0)	(6.31e-09)
		2.771 - 4.503	2.593 - 4.376	1.751 - 3.534
x51	dailyactivitiestop	6.216***	6.010***	5.562***
		(0)	(0)	(0)
		5.011 - 7.421	4.971 - 7.050	4.641 - 6.482
x52	workcapacitybottom	1.185**	1.051*	2.225***
		(0.00239)	(0.0415)	(2.77e-07)
		0.420 - 1.950	0.0404 - 2.062	1.376 - 3.073
x53	workcapacitymid	3.537***	3.942***	3.534***
		(0)	(0)	(0)
		2.693 - 4.382	3.078 - 4.807	2.691 - 4.376
x54	workcapacitytop	4.842***	4.977***	6.214***
		(0)	(0)	(0)
		3.933 - 5.752	4.064 - 5.889	5.143 - 7.285

Table 6.1 is continued on the next page

Table 6.1 continued

SBWMNL choice models for each study arm

VARIABLES	LABELS	(1) wg choice	(2) non choice	(3) control choice
x55	selfsatisfactionbottom	1.611***	1.130**	2.232***
		(0.000132)	(0.00813)	(1.79e-07)
		0.785 - 2.438	0.293 - 1.966	1.394 - 3.070
x56	selfsatisfactionmid	2.570***	3.711***	3.566***
		(6.59e-10)	(0)	(0)
		1.754 - 3.385	2.841 - 4.581	2.672 - 4.461
x57	selfsatisfactiontop	3.819***	5.515***	5.465***
		(0)	(0)	(0)
		2.980 - 4.659	4.484 - 6.546	4.486 - 6.445
x58	relationshipsbottom	0.661	1.362**	1.799***
		(0.124)	(0.00421)	(3.34e-05)
		-0.180 - 1.502	0.429 - 2.294	0.949 - 2.649
x59	relationshipsmid	3.288***	3.870***	4.111***
		(0)	(0)	(0)
		2.433 - 4.142	2.973 - 4.768	3.253 - 4.970
x60	relationshipstop	4.748***	5.793***	5.558***
		(0)	(0)	(0)
		3.836 - 5.660	4.748 - 6.838	4.625 - 6.492
x61	sexlifebottom	1.241**	2.187***	1.931***
		(0.00108)	(1.83e-06)	(8.63e-06)
		0.497 - 1.986	1.289 - 3.086	1.080 - 2.782
x62	sexlifemid	3.032***	3.208***	3.523***
		(0)	(0)	(0)
		2.195 - 3.868	2.358 - 4.057	2.691 - 4.354
x63	sexlifetop	3.472***	5.027***	5.169***
		(0)	(0)	(0)
		2.572 - 4.371	4.056 - 5.999	4.226 - 6.113
x64	supportbottom	0.587	2.166***	1.853***
		(0.157)	(5.62e-07)	(7.62e-05)
		-0.226 - 1.400	1.318 - 3.014	0.935 - 2.771
x65	supportmid	2.948***	2.955***	3.491***
		(0)	(0)	(0)
		2.095 - 3.801	2.118 - 3.793	2.628 - 4.353
x66	supporttop	4.316***	6.039***	5.559***
		(0)	(0)	(0)
		3.458 - 5.174	4.995 - 7.082	4.624 - 6.495
x67	livingconditionsbottom	1.788***	1.260**	1.332**
		(6.60e-05)	(0.00508)	(0.00127)
		0.910 - 2.666	0.379 - 2.142	0.522 - 2.143
x68	livingconditionsmid	2.655***	3.839***	4.033***
		(1.02e-09)	(0)	(0)
		1.803 - 3.507	2.933 - 4.745	3.178 - 4.887
x69	livingconditionstop	5.668***	6.114***	4.846***
		(0)	(0)	(0)
		4.578 - 6.758	5.075 - 7.154	3.954 - 5.739
x70	healthservaccessbottom	0.882*	0.885	0.690
		(0.0431)	(0.0530)	(0.103)
		0.0273 - 1.736	-0.0114 - 1.781	-0.139 - 1.518
x71	healthservaccessmid	3.489***	4.153***	2.995***
		(0)	(0)	(0)
		2.660 - 4.317	3.220 - 5.086	2.113 - 3.877
x72	healthservaccesstop	4.880***	5.238***	5.622***
		(0)	(0)	(0)
		3.909 - 5.851	4.233 - 6.244	4.629 - 6.615
x73	transportbottom	0.947*	1.118*	1.862***
		(0.0192)	(0.0190)	(3.83e-05)
		0.154 - 1.740	0.184 - 2.051	0.976 - 2.748
x74	transportmid	2.646***	3.443***	3.147***
		(3.57e-10)	(0)	(0)
		1.819 - 3.473	2.555 - 4.331	2.234 - 4.059
x75	transporttop	4.076***	4.710***	5.205***
		(0)	(0)	(0)
		3.236 - 4.917	3.790 - 5.630	4.282 - 6.129
x77	depressionmid	2.308***	2.606***	2.713***
		(7.25e-08)	(9.70e-08)	(0)
		1.468 - 3.148	1.648 - 3.564	1.926 - 3.500
x78	depressiontop	3.493***	4.525***	4.889***
		(0)	(0)	(0)
		2.602 - 4.385	3.641 - 5.408	3.969 - 5.810
x79	foodenoughbottom	0.855	0.962*	0.796
		(0.0643)	(0.0285)	(0.0617)
		-0.0506 - 1.760	0.101 - 1.823	-0.0390 - 1.630
x80	foodenoughmid	2.789***	4.150***	3.715***
		(1.06e-08)	(0)	(0)
		1.833 - 3.745	3.212 - 5.088	2.854 - 4.576
x81	foodenoughtop	5.396***	5.292***	5.480***
		(0)	(0)	(0)
		4.438 - 6.354	4.276 - 6.309	4.514 - 6.445
Observations		4,833	4,725	4,860

pval in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Figure 6.7, Figure 6.8 and Figure 6.9 show the utility scores for all 5 levels of each quality of life attribute, constructed using the methodology detailed in §6.4.3, for each study arm, respectively. The box and whiskers plots in each graph represent the 5 levels as follows: the utility score of level 1 (the lowest level - 'bottom') is at the bottom end of the bottom whisker; the utility score of level 2 is the value at the bottom of the box; the utility score of level 3 ('mid') is the value at the line inside the box; the utility score of level 4 is the value at the top of the box; and the utility score of level 5 (the highest level -'top') is the value at the top end of the top whisker (see the WHOQoL-BREF questionnaire in Appendix E for further description of each of the levels for each attribute). These individual attribute-level utility scores together constitute a utility tariff, and were used to construct total utility scores for each respondent, based on the levels of each attribute they stated they had experienced in the last 2 weeks in response to the WHOQoL-BREF survey, and the study arm the respondent was in - i.e. the preferences (utility scores) for arm 1 were used for all respondents in arm 1. These results are presented and discussed in §6.5.5 below.

Here it is worth re-stating the importance of constructing utility tariffs in the first place. By explicitly taking account of the preferences respondents have regarding the *relative* importance of each quality of life attribute-level, utility tariffs enable the construction of utility functions that contain a richer description of the quality of life of the respondents. Preference-weighting could also be determined by rating scales or other methods that do not explicitly require the consideration of opportunity costs. However, as shown in the following sub-section, such methods are less desirable as they contain less-explicitly-elicited and therefore less-useful information regarding the preferences of respondents, and hence in this case, lead to less-nuanced and less-detailed evaluations of respondents' quality of life.

6.5.4 Comparison with weighting using Importance questions

The third objective of this chapter is to compute a utility function that has more information on respondents' preferences than one based on the rating scale method of the WHO. This section will first explore the strength and weaknesses of the rating scale method with respect to measuring utility. Benefits exclusive to a continuos-scale utility function, computed in this study from the SBWMNL choice model results, are then detailed, along with limitations of this method. The results of the use of both methods are used to illustrate the superiority of the DCE-derived preference-weighted utility function; its superiority justified mainly on its greater range of applications.

The WHO-recommended method of weighting the WHOQoL-BREF attributes is asking respondents how important each one is on a rating scale of 1 to 5. This method has the benefit of simplicity and is perhaps easier to understand than a DCE. However, it does not require respondents to trade off the different attributes against each other. It is possible for a respondent to rank all attributes as 5: 'most important', for example. In such a case, the respondent is effectively indicating that all the attributes are equally important rather than all 'most' important, even though she may not be thinking that at the time of completing the 'importance' questions. Therefore, the respondent is not required to explicitly consider opportunity costs in

Figure 6.7: SBWMNL, rescaled coefficients, - women's group members (arm 1)

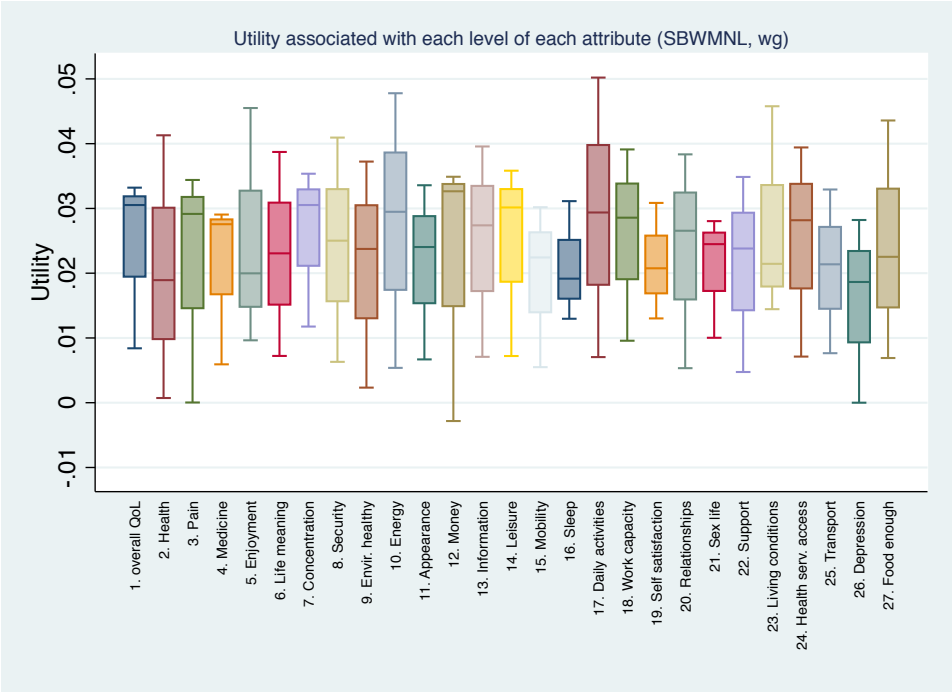


Figure 6.8: SBWMNL, rescaled coefficients, - non-members in the same village (arm 2)

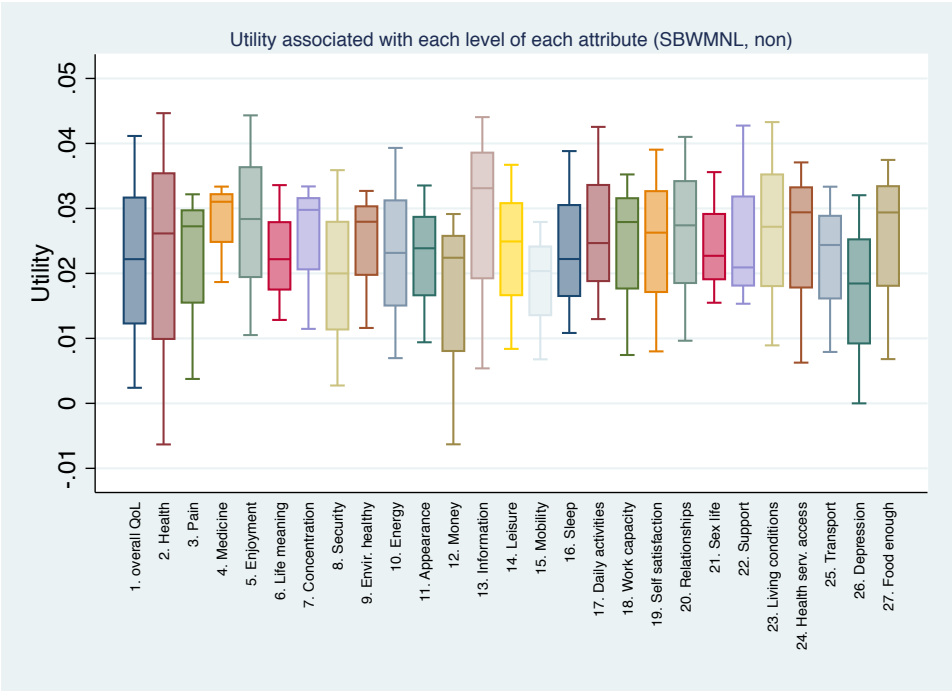
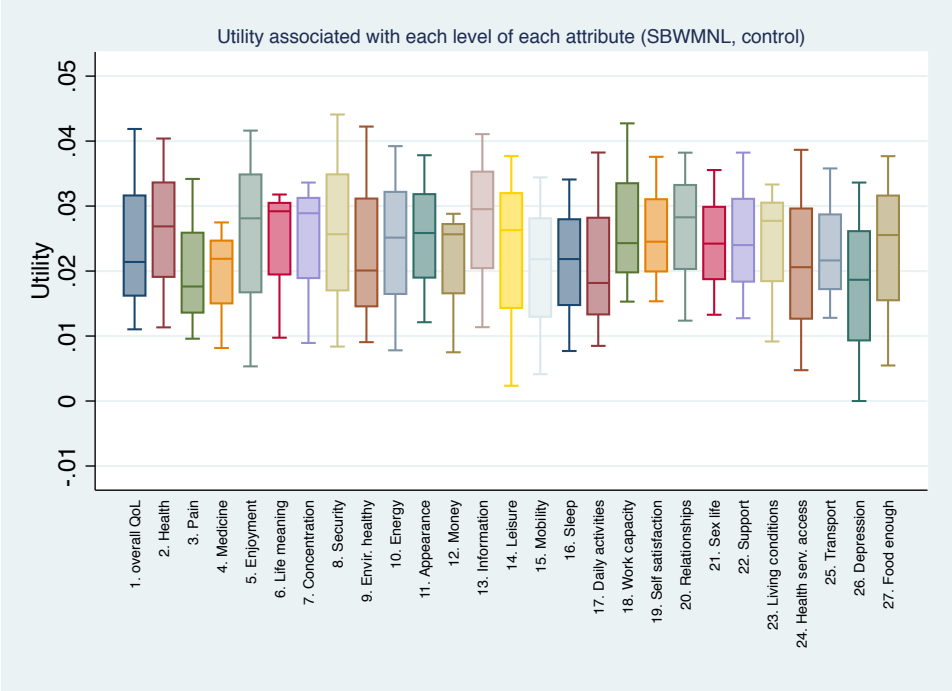


Figure 6.9: SBWMNL, rescaled coefficients, - control area women (arm 3)



the WHO rating scale method. Any resulting 'utility function' is therefore unlikely to be based on how respondents might value the different areas of quality of life relative to each other. The rating-scale 'importance' questions method also suffers from an additional problem. Given that it does not require respondents to consider the different levels of each quality of life attribute, it does not collect any information regarding how important the respondents consider specific levels of each attribute to be. Indeed, without explicitly being asked to consider the different levels of each attribute, it may be harder for respondents to conceptualise what each specific quality of life attribute means, and therefore harder for them to rate the attribute in the first place. As it does not estimate the importance or value of the different levels of each attribute with respect to each other, the rating-scale method is not capable of generating a utility tariff or function.

Table 6.3 shows the results of the rating-scale 'importance' questions for each of the 27 attributes of the WHOQoL-BREF, and, averaging the scores across the attributes comprising each of them (see Equations 3.1- 3.5 on page 58), the four multi-attribute domains. In general, the 'importance' questions resulted in a narrow spread of 'importance' scores (weights) near the top end of the 1-5 scale. As stated above, this narrow range of difference in weights between the attributes implies that they are relatively equally valued, despite the fact that when completing the 'importance' questions the respondents were not asked to consider the relative importance of each attribute. In contrast, due to the explicit consideration of different levels of each attribute, the utility tariff weights estimated by the DCE cover a wider relative range of values, as shown for each study arm in Figures 6.7-6.9. It is useful to note here, however, that there is convergence

between weightings of the attributes derived from the rating-scale questions and weightings derived from the utility scores of the 'top' levels of each attribute (but not the 'bottom'-levels). Such tests of convergent validity are detailed and discussed, along with others concerning other aspects of the empirical work of this thesis, in §8.1.

The SBWMNL model results obtained from the BWS DCE also overcome the other main objections to the rating-scale questions. They are based on respondents indicating which quality of life attribute-levels they prefer, in choices, that by their nature involve the consideration of how important each attribute-level is *relative* to the others they were shown in the task. Constructing a utility function from the DCE results that considers the levels of all attributes on a continuous scale is therefore possible, when it was not using the rating scale results. Such a continuos-scale utility function has clear advantages over the rating-scale results. First-order differentials of the utility function can be used to compute marginal utility gains or losses at different levels of 'consumption' of interventions; and also, elasticities related to changes in the intervention, or the study population(s), over time. Such applications are of clear importance to researchers as they tell us more about populations and the effects of interventions. They are also clearly of importance in economic evaluation as they allow comparison of interventions based on the absolute and relative amounts of utility they generate. Hence, they are useful to policy makers and appraisers of interventions. The main limitation to the DCE approach to constructing a utility function is the extra complexity of the task, the consequent burden on the respondent perhaps leading to inconsistent responses (see §6.5.1) and therefore biased utility estimates. It is worth noting here, however, that in comparison to the rating-scale method, extra time for completion of the questionnaire is not required. Additional limitations are related to the accuracy of the statistical (§6.4.1) and mathematical (§6.4.3) specifications of the utility function in modelling people's utility. As noted earlier in §2.3.2, whether or not measuring utility is appropriate in the first place is also an issue, and is discussed further in §8.2 and §8.6. Assuming measurement of utility is appropriate, however, it is clear from the above that the DCE method is superior to the rating-scale 'importance' questions method recommended by the WHO.

6.5.5 Comparing preference-weighted quality of life attributes between study arms

As an extension to the comparative analysis of WHOQoL-BREF quality of life scores between study arms detailed in Tables 4.2 and 4.3, and explained in §4.1.4.1, §4.2.2 and §4.2.3, the same analyses can be repeated using the preference-weighted scores, constructed using the utility scores for each level of each attribute calculated from the SBWMNL results, as detailed in §6.4.3. The results of these analyses are shown in Table 6.4 for the unadjusted t-test analyses and Table 6.5 for the results of stepwise multivariate regressions also involving the socio-demographic variables and interviewer effects. Readers are encouraged to re-read §4.1.4.1, §4.2.2 and §4.2.3, for ease of interpretation and comparison of the preference-weighted results with the unweighted results. Convergent validity between the two sets of analyses is, however, summarised and discussed further in §8.1.

Table 6.3: Weightings of the WHOQoL-BREF quality of life domains and facets by the Importance questions

WHOQoL-BREF Quality of life area	**Total Sample**	Women's group members	non-members in the same village	Control area women
	n=106	n=36	n=34	n=36
Physical domain	4.27	4.43	4.10	4.28
Psychological domain	4.13	4.27	3.97	4.13
Social Relationships domain	4.18	4.33	4.07	4.13
Environment domain	4.28	4.36	4.16	4.32
1. overall QoL	4.28	4.47	4.15	4.22
2. Health	4.45	4.56	4.47	4.33
3. Pain	4.36	4.36	4.29	4.42
4. Medicine	3.71	3.92	3.91	3.31
5. Enjoyment	4.51	4.58	4.41	4.53
6. Life meaning	3.92	3.89	3.94	3.94
7. Concentration	4.28	4.28	4.15	4.42
8. Security	4.58	4.64	4.56	**4.56**
9. Envir. healthy	4.10	4.25	3.97	4.08
10. Energy	4.54	4.74	4.21	4.64
11. Appearance	3.97	4.00	3.91	4.00
12. Money	4.27	4.28	4.26	4.28
13. Information	4.36	4.22	4.44	4.42
14. Leisure	4.26	4.44	4.15	4.19
15. Mobility	3.67	3.89	3.26	3.83
16. Sleep	4.42	4.58	4.24	4.42
17. Daily activities	4.43	4.53	4.29	4.47
18. Work capacity	4.39	4.61	4.06	4.47
19. Self satisfaction	4.38	4.47	4.21	4.44
20. Relationships	4.52	4.61	4.41	4.53
21. Sex life	4.10	4.29	3.91	4.09
22. Support	3.92	4.08	3.88	3.78
23. Living conditions	4.00	4.14	3.62	4.22
24. Health serv. access	4.50	4.53	4.35	4.61
25. Transport	4.14	4.34	3.91	4.17
26. Depression	3.70	4.46	3.21	3.44
27. Food enough	4.68	4.78	4.50	4.74
Key:				
low: 0 to 2.999	med: 3 to 3.999		high: 4 to 5	

As can be seen from Table 6.5, even after adjusting for multiple hypothesis testing (see footnote to table), and interviewer effects and socio-demographic variables, there are many significant differences between the study arms, and many more than between the un-preference-weighted WHOQoL-BREF scores in Table 4.3. From Table 6.4, which also shows the preference-weighted scores for each arm, it is apparent that the order of greatest score to least score by study arm is also different to that of the unweighted scores in Table 4.2. This is likely to be due to the different preference weightings from different study arms. It is also important to note here that if the utility tariffs (preference weightings) for each study arm were constructed using exponentiated odds ratio or probability coefficients (see Appendix S on page 423), then the differences between arms would likely be even more extreme. As such, the approach taken here is highly conservative. Given that heterogeneity of preferences dependent on socio-demographic characteristics was not investigated (see §6.4.4), these multivariate analyses are limited by the fact that the weighted quality of life scores for each study arm that are being compared are constrained to be representative of the average preferences for members of each study arm as a whole, rather than being estimated using the preferences for each individual, or according to various socio-demographic groupings. In addition, whilst interviewer effects are included in the models, and are indeed common, like they were for the analyses of the unweighted scores (Table 4.2.3 on page 89), they were not estimated in the choice models which underly the preference weights used for each study arm.

Taking the results of Table 6.5 as representative though, it is worth briefly discussing the results for each quality of life domain in turn, focusing on the women's group members, the main group of interest in this thesis. The preference-weighted scores of the physical domain as a whole were found to be significantly higher in the villages containing women's groups (members and non-members combined) than the control villages (dark blue shading)[26], with both study arms appearing to equally contribute to this difference (red and pink shading, and no significant differences between the members and non-members). This result was the opposite to that observed for the unweighted scores (see Table 4.3 on page 93). Within the physical domain *q4 dependence on medicine* was found to have higher preference-weighted scores in villages containing women's groups (dark blue shading), with this difference characterised by the non-members having higher scores in this facet than both the women in control villages (pink shading - second page of table) and the women's group members in their village (light blue shading). Women's group members, on the other hand, were found to have higher preference-weighted scores for the *q10 energy* facet than non-members; and were also found to have higher preference-weighted *q17 daily activities* and *q18 work capacity* scores. Women's group members were found to have lower *q15 mobility* scores than control women and lower *q16 sleep* scores than non-members though.

Preference-weighted scores for the psychological domain as a whole were found to be significantly lower in women's group members than control women, and within the psychological

[26]please note that the differences in scores are much smaller than for the unweighted scores, due to the total preference-weighted scores being small as a result of the utility tariff weights being on a 0-1 scale, with all 27 'top' levels adding up to 1. Therefore maximum average domain scores will typically be around 0.2 and maximum average facet scores around 0.03, as shown in Table 6.4.

Table 6.4: T-Tests of the difference in preference-weighted WHOQoL-BREF domain and facet scores between WG members, non-members and control arm women

	WG members (wg) (n=179)		non-members in same village (non) (n=175)		control village women (control) (n=180)		order of scores[a]	T-Test p-values[b]		
Quality of Life Domain (facet)	mean	se(mean)	mean	se(mean)	mean	se(mean)	greatest>least	p wgnon	p wgcontrol	p noncontrol
Physical	**0.2035**	**0.0033**	**0.1891**	**0.0025**	**0.1887**	**0.0030**	**wg>non≈control**	**0.0006**	**0.0010**	0.9314
Pain (q3)	0.0281	0.0007	0.0282	0.0005	0.0286	0.0006	control≈non≈wg	0.9578	0.6018	0.5771
Medicine (q4)	0.0236	0.0006	0.0277	0.0004	0.0209	0.0005	non>wg>control	**2E-08**	**0.0006**	**9.4E-24**
Energy (q10)	0.0359	0.0010	0.0263	0.0008	0.0293	0.0008	wg>control>non	**2E-12**	**7E-07**	***0.0092***
Mobility (q15)	0.0204	0.0006	0.0195	0.0004	0.0223	0.0007	control≈wg wg≈non (control>non)	0.2083	0.0371	**0.0009**
Sleep (q16)	0.0241	0.0005	0.0264	0.0006	0.0265	0.0005	control≈non>wg	**0.0043**	**0.0009**	0.9097
Daily activities (q17)	0.0388	0.0009	0.0316	0.0006	0.0279	0.0007	wg>non>control	**5E-10**	**8E-19**	**0.0001**
Work capacity (q18)	0.0321	0.0006	0.0294	0.0004	0.0332	0.0006	control≈wg>non	**0.0005**	0.2081	**7E-07**
Psychological	**0.1629**	**0.0023**	**0.1629**	**0.0022**	**0.1664**	**0.0021**	**control≈wg=non**	0.9890	0.2561	0.2424
Enjoyment (q5)	0.0297	0.0009	0.0340	0.0007	0.0322	0.0008	non≈control control≈wg (non>wg)	**0.0002**	0.0364	0.0786
Life meaning (q6)	0.0286	0.0007	0.0245	0.0005	0.0266	0.0005	wg>contro>non	**2E-06**	***0.0260***	**0.0032**
Concentration (q7)	0.0329	0.0003	0.0299	0.0004	0.0298	0.0004	wg>non≈control	**4E-09**	**7E-09**	0.8780
Appearance (q11)	0.0267	0.0006	0.0252	0.0006	0.0278	0.0007	control≈wg wg≈non (control>non)	0.0569	0.2580	**0.0039**
Self satisfaction (q19)	0.0259	0.0004	0.0309	0.0005	0.0290	0.0004	non>control>wg	**2E-13**	**1E-07**	***0.0085***
Depression (q26)	0.0190	0.0007	0.0185	0.0008	0.0207	0.0008	control≈wg≈non	0.6703	0.0898	0.0498
Social Relationships	**0.0817**	**0.0012**	**0.0894**	**0.0014**	**0.0863**	**0.0012**	**non>control>wg**	**4.E-05**	***0.0077***	0.0866
Relationships (q20)	0.0330	0.0005	0.0331	0.0006	0.0314	0.0005	non≈wg≈control	0.8716	0.0354	0.0346
Sex life (q21)	0.0250	0.0004	0.0288	0.0005	0.0286	0.0005	non≈control>wg	**5E-09**	**4E-08**	0.7488
Support (q22)	0.0239	0.0007	0.0269	0.0007	0.0263	0.0006	non≈control>wg	**0.0030**	***0.0128***	0.4895
Environmental	**0.2040**	**0.0033**	**0.1872**	**0.0034**	**0.1934**	**0.0031**	**wg>control≈non**	**0.0004**	***0.0191***	0.1761
Security (q8)	0.0318	0.0007	0.0237	0.0007	0.0330	0.0009	control≈wg>non	**1E-13**	0.2927	**5E-15**
Envir. Healthy (q9)	0.0274	0.0007	0.0258	0.0005	0.0282	0.0008	control≈wg wg≈non (control>non)	0.0817	0.4952	***0.0174***
Money (q12)	0.0102	0.0010	0.0049	0.0008	0.0109	0.0004	control≈wg>non	**4E-05**	0.5568	**1E-10**
Information (q13)	0.0238	0.0008	0.0266	0.0010	0.0218	0.0007	non≈wg wg≈control (non>control)	0.0298	0.0778	**0.0001**
Leisure (q14)	0.0277	0.0006	0.0241	0.0007	0.0242	0.0009	wg>control≈non	**0.0001**	**0.0023**	0.9650
Living conditions (q23)	0.0312	0.0009	0.0297	0.0008	0.0277	0.0005	wg≈non>control	0.1842	**0.0003**	***0.0238***
Health serv. Access (q24)	0.0304	0.0006	0.0302	0.0006	0.0246	0.0007	wg≈non>control	0.8182	**7E-09**	**8E-09**
Transport (q25)	0.0212	0.0006	0.0219	0.0006	0.0231	0.0006	control≈non non≈wg (control>wg)	0.3953	***0.0185***	0.1334
Food enough (q27)	0.0232	0.0009	0.0221	0.0008	0.0216	0.0008	wg≈non≈control	0.3412	0.1765	0.6708
Overall (q1)	**0.0266**	**0.0006**	**0.0222**	**0.0008**	**0.0290**	**0.0007**	**control>wg>non**	**2E-05**	***0.0100***	**1E-09**
Health (q2)	**0.0278**	**0.0009**	**0.0314**	**0.0010**	**0.0322**	**0.0006**	**control≈non>wg**	***0.0079***	**5E-05**	0.4601

[a] ≈ indicates non-significant difference - see T-Test p-value columns. The arms are still in order of mean score though, from highest (left) to lowest (right)

[b] P-values are highlighted to show equivalent significance after adjusting for multiple hypothesis testing using Benjamini and Hochberg's False Discovery Rate correction: (m/N)*s where m is the rank order of the p-value with highest values given highest ranks, N is the total number tested (18 for domain scores, and 75 for facet scores) and s is the signficance rate cut-off level: I have used 0.05, 0.01 and 0.001.

<0.05 **<0.01** **<0.001** E=exponent (base 10) e.g. 2E-06 = 2×10^{-6}

domain, women's group members were found to have lower *q11 appearance* and *q19 self satisfaction* facet scores than control women, but higher *q7 concentration* scores. Compared to non-members, women's group members were also found to have higher *q7 concentration* scores, and *q6 life meaning* scores (the same result being found in the adjusted regression analysis of the unweighted scores), but lower *q5 enjoyment* and *q19 self satisfaction* scores. The latter two results are perhaps counter-intuitive given the nature of the groups as described by the women themselves (see §4.2.4), and could be an indication of the already-acknowledged limitations of this analysis.

Social relationships domain scores, when weighted using the data from the choice models, were found to be significantly lower in women's group members than both non-members in the same village (light blue shading) and control women (dark red shading - second page of table); the same was true for the *q21 sex life* and *q22 support* facets within the social domain.

Although preference-weighted domain scores for the environment domain as a whole were not found to be significantly different between any of the combinations of the three study arms involving women's groups, within the environment domain, women's group members were found to have higher scores than non-members for the *q8 security*, *q12 money* and *q14 leisure* facets, but lower scores for the *q13 information* and *q25 transport* facets. Compared to control women, the women's group members had significantly higher preference-weighted scores in the *q23 living conditions* and *q24 health service access* facets of the environment domain (the latter result is the same as observed in the analysis of unweighted scores), but significantly lower scores in the *q12 money* and *q25 transport* facets.

Women's group members were found to have significantly higher preference-weighted scores for *q1 overall health* than non-members in the same village, but lower *q2 health* scores than both non-members and control women. This latter result is unexpected given the focus of the women's group on health, however, like the other results, could be due to inaccuracies in the preference-weights and, crucially, the lower scores being endogenous to the women's group members. Indeed, as with the unadjusted analyses, endogeneity could not be ruled out for any of the facet or domain scores.

In addition to these problems with the data, without pre-defined hypotheses regarding potential mechanisms for the observed differences between the study arms[27], and without tailored qualitative data collection to explore them, it is difficult to make sense of the multitude of observed differences between the study arms. Overall, Table 6.5 indicates that roughly an equal number of domain and facet scores were highest in each of the study arms.

[27]note that such hypotheses would require previous evidence to be robust to the opinions of researchers, and such pre-existing evidence regarding the women's groups does not exist. Although here is it is probably useful to note that the women's groups cannot be expected to have effects on all 27 areas of quality of life measured by the WHOQoL-BREF.

Table 6.5: Multivariate estimation of preference-weighted quality of life domain and facet scores

Preference-weighted scores (weights from SBWMNL models, one for each study arm, from the BWS DCE data)	Variables remaining in backward stepwise regression with p<0.05 cut-off for remaining in the model																					Multivariate regression results: *significant negative association*; **signfiicant positive association;** ns = not significant (not remaining in model)							
	1. Villages containing WG (wg members + non-members) vs. Control villages: Reference = control		2. Within WG villages: WG members vs. non-members: Reference = non-members		(3.) Study arm: Reference = control		significant negative association:	(significant positive association: no hatching)	Education: Reference=None			Marital Status: Reference = Married					Interviewer: Reference = Interviewer 1					Villages containing Women's groups (women's group members and non-members combined) compared to control villages				Women's groups compared to non-members in the same village			
Quality of Life Domain (facet)	Women's group members and non-members combined in the same village		Women's group members		Women's group members	non-members in the same village			Primary Standard 1-4	Primary Standard 5-8	Secondary	No answer	Single	Living as Married	Separated	Divorced	Widowed	Ill: Reference category=not ill	Age (years)	Age^2	Interviewer 2	Interviewer 3	Interviewer 4	Interviewer 5	Coef.	p[a]>|t|	lower	upper	Coef.	p[a]>|t|	lower	upper
Physical																							**0.008**	**0.013**	**0.002**	**0.014**		ns		
Pain (q3)																								ns				ns		
Medicine (q4)																							**0.004**	**0.000**	**0.004**	**0.005**	*-0.007*	*0.000*	*-0.008*	*-0.006*
Energy (q10)																								ns			**0.007**	**0.000**	**0.005**	**0.010**
Mobility (q15)																							*-0.003*	*0.000*	*-0.004*	*-0.002*		ns		
Sleep (q16)																							*-0.002*	*0.020*	*-0.003*	*0.000*	*-0.004*	*0.000*	*-0.005*	*-0.002*
Daily activities (q17)																							**0.008**	**0.000**	**0.006**	**0.009**	**0.008**	**0.000**	**0.005**	**0.010**
Work capacity (q18)																							*-0.002*	*0.002*	*-0.003*	*-0.001*	**0.003**	**0.000**	**0.001**	**0.004**
Psychological																								ns				ns		
Enjoyment (q5)																								ns			*-0.004*	*0.000*	*-0.006*	*-0.002*
Life meaning (q6)																								ns			**0.004**	**0.000**	**0.002**	**0.005**
Concentration (q7)																							**0.002**	**0.000**	**0.001**	**0.003**	**0.002**	**0.000**	**0.001**	**0.003**
Appearance (q11)																							*-0.004*	*0.000*	*-0.005*	*-0.002*		ns		
Self satisfaction (q19)																								ns			*-0.006*	*0.000*	*-0.007*	*-0.005*
Depression (q26)																								ns				ns		
Social Relationships																								ns			*-0.010*	*0.000*	*-0.014*	*-0.006*
Relationships (q20)																								ns				ns		
Sex life (q21)																							*-0.001*	*0.012*	*-0.002*	*0.000*	*-0.005*	*0.000*	*-0.006*	*-0.003*
Support (q22)																								ns			*-0.003*	*0.003*	*-0.005*	*-0.001*
Environmental																								ns				ns		
Security (q8)																							*-0.006*	*0.000*	*-0.008*	*-0.004*	**0.006**	**0.000**	**0.004**	**0.008**
Envir. Healthy (q9)																							*-0.002*	*0.026*	*-0.004*	*0.000*		ns		
Money (q12)																							*-0.007*	*0.000*	*-0.009*	*-0.001*	**0.005**	**0.000**	**0.003**	**0.007**
Information (q13)																								ns			*-0.003*	*0.012*	*-0.006*	*-0.001*
Leisure (q14)																								ns			**0.002**	**0.016**	**0.000**	**0.004**
Living conditions (q23)																							**0.003**	**0.002**	**0.001**	**0.004**		ns		
Health serv. Access (q24)																							**0.006**	**0.000**	**0.004**	**0.008**		ns		
Transport (q25)																							*-0.002*	*0.001*	*-0.003*	*0.001*	*-0.003*	*0.002*	*-0.004*	*-0.001*
Food enough (q27)																								ns				ns		
Overall (q1)																								ns			**0.004**	**0.000**	**0.002**	**0.006**
Health (q2)																								ns			*-0.003*	*0.012*	*-0.006*	*-0.001*

[a] The equivalent significance of the p-values was adjusted to account for multiple hypothesis testing using Benjamini and Hochberg's False Discovery Rate correction: (m/N)*s where m is the rank order of the p-value with highest values given highest ranks, N is the total number tested (3 for domain scores, and 17 for facet scores) and s is the signficance rate cut-off level: I have used 0.05, 0.01 and 0.001. Given most of the p-values were very low, none of them shown in this table were found to no longer be signficant at the p<0.05 level after these corrections

Table 6.5 continued on the next page

Table 6.5 on the preceding page continued:

Multivariate regression results: *significant negative association*; **signfiicant positive association;** ns = not significant (not remaining in model)

Quality of Life Domain (facet)	Women's group members compared to control				non-members compared to control				Is Quality of life score likely to be endogenous to women's group members?[b]		
	Coef.	p[a]>|t|	lower	upper	Coef.	p[a]>|t|	lower	upper	F	H	S
Physical	**0.008**	**0.013**	**0.001**	**0.016**	**0.008**	**0.035**	**0.001**	**0.015**	Yes	N/A	Yes
Pain (q3)		ns				ns			**No**	N/A	Yes
Medicine (q4)		ns			**0.007**	**0.000**	**0.006**	**0.008**	Yes	N/A	Yes
Energy (q10)	**0.006**	**0.000**	**0.004**	**0.008**		ns			Yes	N/A	Yes
Mobility (q15)	*-0.003*	*0.000*	*-0.005*	*-0.002*	*-0.003*	*0.001*	*-0.0041*	*-0.0011*	**No**	N/A	Yes
Sleep (q16)	*-0.004*	*0.000*	*-0.005*	*-0.002*		ns			Yes	N/A	Yes
Daily activities (q17)	**0.010**	**0.000**	**0.008**	**0.012**	**0.005**	**0.000**	**0.003**	**0.007**	Yes	N/A	Yes
Work capacity (q18)		ns			*-0.002*	*0.003*	*-0.0033*	*-0.0007*	Yes	N/A	Yes
Psychological	*-0.006*	*0.032*	*-0.011*	*-0.001*		ns			Yes	N/A	Yes
Enjoyment (q5)		ns			**0.004**	**0.000**	**0.002**	**0.006**	Yes	N/A	Yes
Life meaning (q6)		ns			*-0.004*	*0.000*	*-0.0055*	*-0.0026*	Yes	N/A	Yes
Concentration (q7)	**0.002**	**0.000**	**0.002**	**0.003**		ns			Yes	N/A	Yes
Appearance (q11)	*-0.004*	*0.000*	*-0.006*	*-0.002*	*-0.004*	*0.000*	*-0.0055*	*-0.0020*	**No**	N/A	Yes
Self satisfaction (q19)	*-0.004*	*0.000*	*-0.005*	*-0.003*	**0.002**	**0.001**	**0.001**	**0.003**	Yes	N/A	Yes
Depression (q26)		ns				ns			Yes	N/A	Yes
Social Relationships	*-0.007*	*0.000*	*-0.010*	*-0.003*	**0.035**	**0.042**	**0.000**	**0.007**	Yes	N/A	Yes
Relationships (q20)		ns			**0.001**	**0.046**	**0.000**	**0.003**	Yes	N/A	Yes
Sex life (q21)	*-0.004*	*0.000*	*-0.005*	*-0.003*		ns			Yes	N/A	Yes
Support (q22)	*-0.003*	*0.000*	*-0.005*	*-0.002*		ns			Yes	N/A	Yes
Environmental		ns			*-0.012*	*0.003*	*-0.0192*	*-0.0038*	Yes	N/A	Yes
Security (q8)		ns			*-0.007*	*0.000*	*-0.0092*	*-0.0054*	Yes	N/A	Yes
Envir. Healthy (q9)		ns				ns			**No**	N/A	Yes
Money (q12)	*-0.005*	*0.000*	*-0.007*	*-0.003*	*-0.010*	*0.000*	*-0.0120*	*-0.0079*	Yes	N/A	Yes
Information (q13)		ns				ns			Yes	N/A	Yes
Leisure (q14)		ns				ns			Yes	N/A	Yes
Living conditions (q23)	**0.003**	**0.004**	**0.001**	**0.005**	**0.002**	**0.016**	**0.000**	**0.004**	Yes	N/A	Yes
Health serv. Access (q24)	**0.006**	**0.000**	**0.004**	**0.008**	**0.006**	**0.000**	**0.004**	**0.008**	**No**	N/A	Yes
Transport (q25)	*-0.003*	*0.000*	*-0.005*	*-0.002*		ns			Yes	N/A	Yes
Food enough (q27)		ns				ns			Yes	N/A	Yes
Overall (q1)		ns			*-0.004*	*0.000*	*-0.0052*	*-0.0019*	Yes	N/A	Yes
Health (q2)	*-0.004*	*0.000*	*-0.006*	*-0.002*		ns			Yes	N/A	Yes

[b]F=F-test evidence; where the residuals of the full multivariate model predicting the quality of life score are tested in a second model predicting women's group membership with the quality of life score and also eductaion, marital status and interviewer (the three variables found to be significantly associated with women's group membership). The F-test tests whether the residuals are significantly different from zero i.e. that they are also predictors of women's group membership. H=Hausman test evidence; where the coefficients of the independent variables common to the first and second models described for the F-test are tested for equality. S=Seemingly unrelated Estimation test evidence; where the test is the same as for the Hausman but the specification allows for depatures from asymptotic normality.

Figure 6.10-Figure 6.15 show the mean and 95%CI values for each facet, by domain, and then each domain, in graphical form, the significant differences generally denoted by the y-axis values (utility scores) of the boxes representing each arm not overlapping.[28]

[28]Some overlap, equivalent to up to one-third of the mean to lower/upper confidence interval could still permit 5% statistical significance given that comparing two or more groups is equivalent to visualisations of 95%CI, for the purposes of assessing statistical significance, being reduced from +/- 1.96 standard errors surrounding the mean to around +/- 1.39 or 1.5 standard errors surrounding the mean depending on the imbalance of standard errors between the two groups (Goldstein and Healy, 1995; Wolfe and Hanley, 2002).

Figure 6.10: SBWMNL, rescaled coefficients, - Physical domain facets by arm

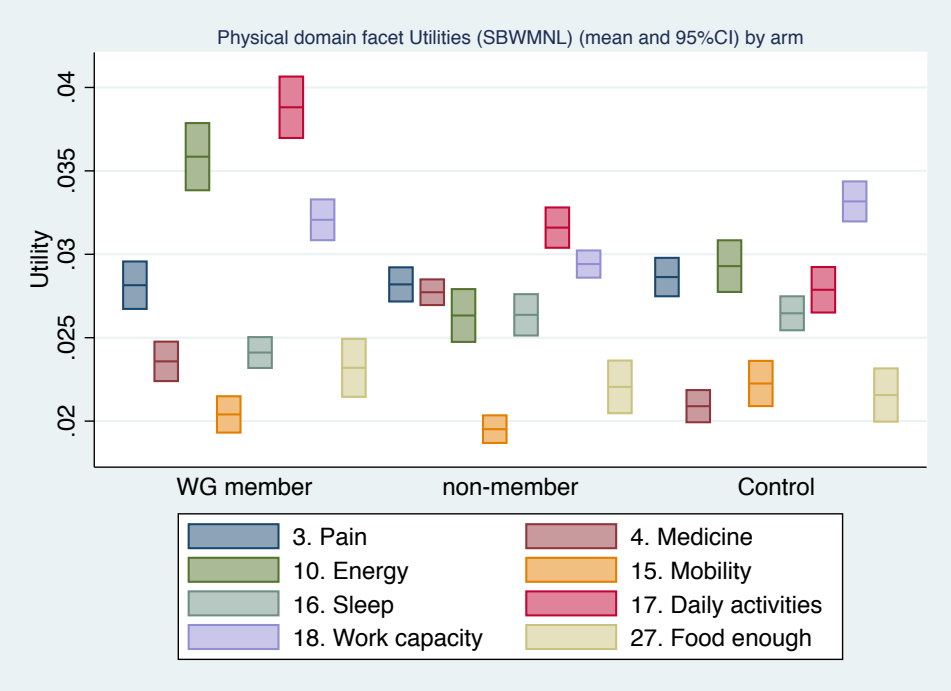


Figure 6.11: SBWMNL, rescaled coefficients, - Psychological domain facets by arm

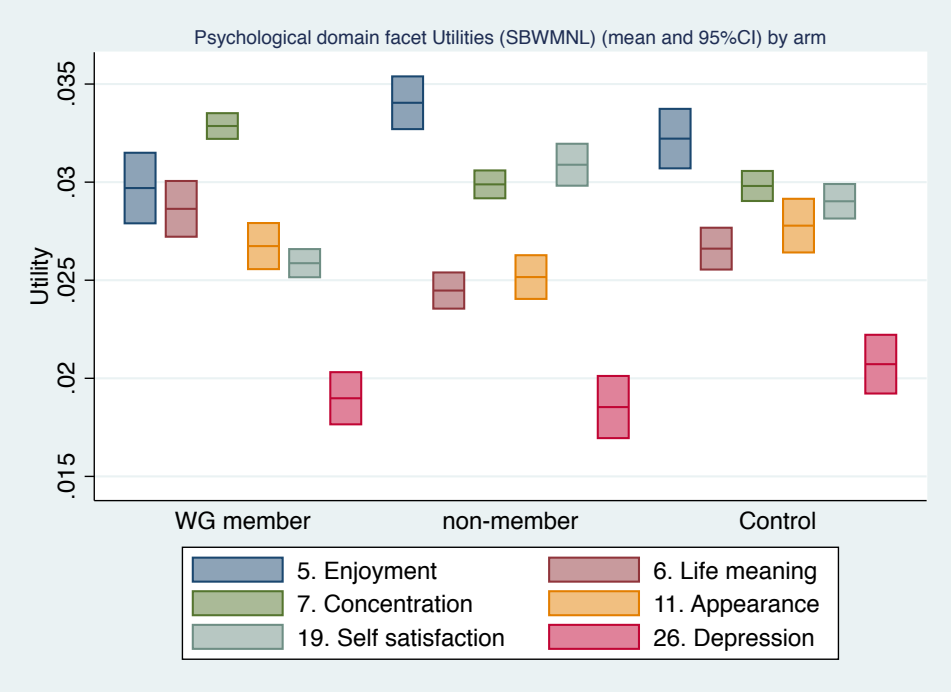


Figure 6.12: SBWMNL, rescaled coefficients, - Social Relationships domain facets by arm

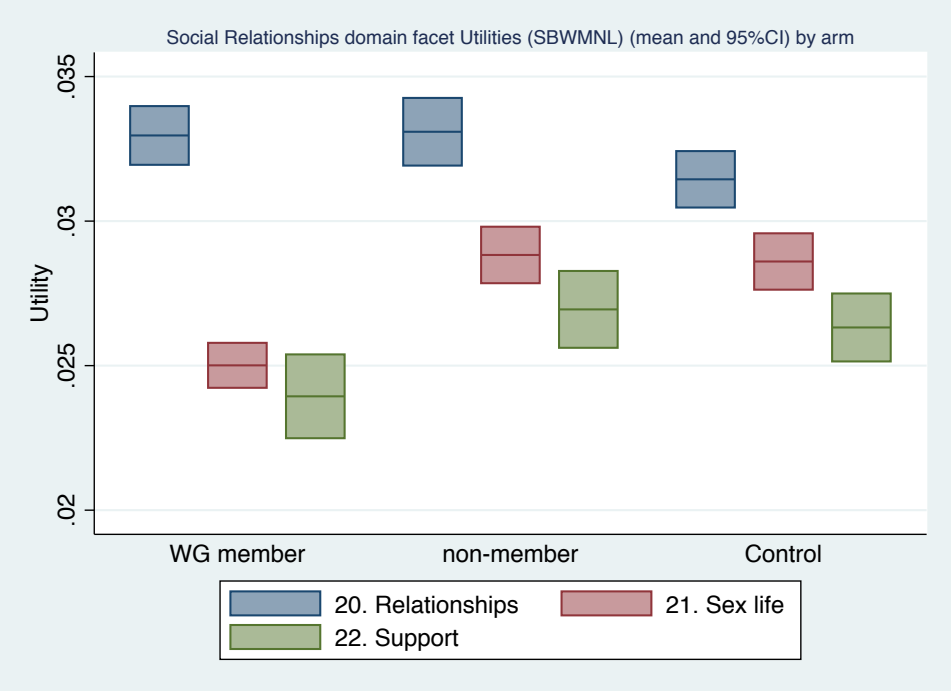


Figure 6.13: SBWMNL, rescaled coefficients, - Environmental domain facets by arm

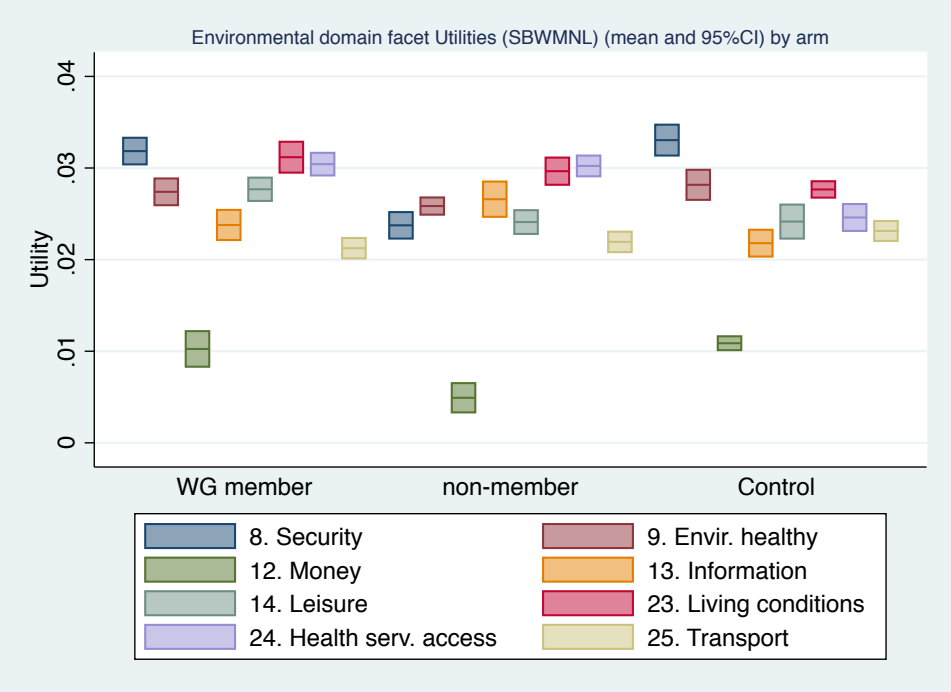


Figure 6.14: SBWMNL, rescaled coefficients, - Domain scores by arm

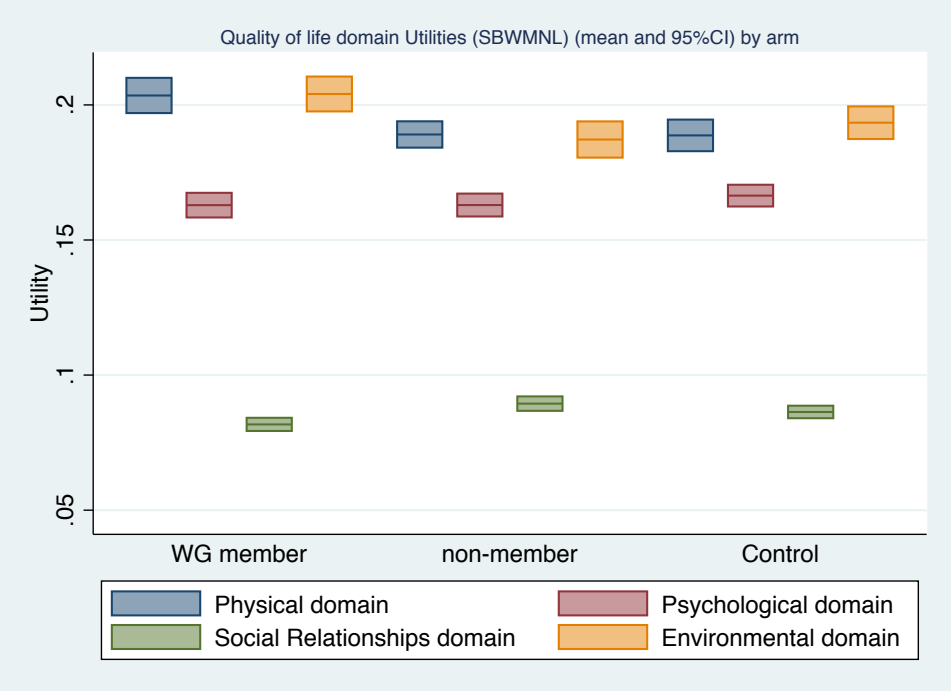
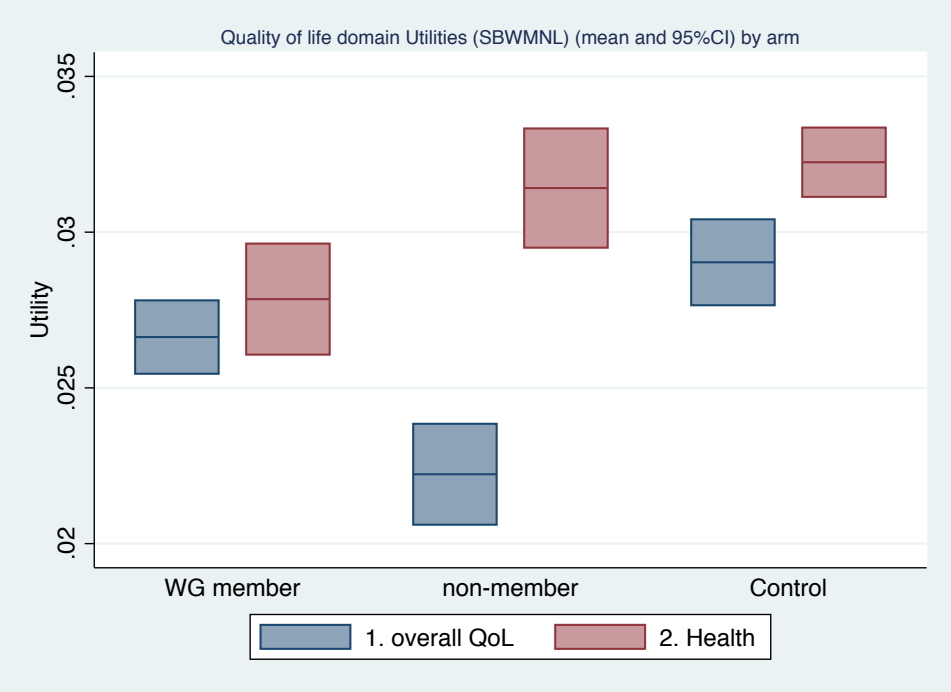


Figure 6.15: SBWMNL, rescaled coefficients, - Overall scores by arm



6.6 Discussion and Applications

The BWS DCE described and presented in this chapter has yielded results that have enabled the estimation of a utility function made up of values for all 5 levels of each of the 27 quality of life attributes of the Chichewa WHOQoL-BREF. Although this constitutes an empirical attempt to measure quality of life from a holistic perspective, this utility function is necessarily a gross over-simplification of the inherent complexities of human life. The main oversimplifications include: areas of quality of life not measured in the WHOQoL-BREF were not included; only including 3 of the 5 levels of each quality of life attribute in the choice task and assuming that the omitted levels have utilities mid-way between the relevant other levels; the influence of potential confounders or effect modifiers not being considered; and interaction terms between combinations of the quality of life attribute-levels, and between the quality of life attribute-level variables and omitted variables, were not considered. The construction of the utility tariff using the raw log odds model coefficients rather than the exponentiated odds ratio or probability coefficients also raises questions of comprehensibility.

In addition, as with any DCE (Ryan et al., 2008a), there are a number of issues related to how well the current choice tasks have produced results that approximate the real-life preferences of respondents. These can be divided into two broad categories: issues related to the content and presentation of the DCE and how the respondents completed the task; and issues related to the statistical efficiency of the design and modelling of the results. Each of these two categories are discussed in the following two subsections. Whether or not measuring a single utility function is appropriate is discussed elsewhere in the thesis, primarily in §2.3.2 and §8.2. Following discussions of the limitations of the BWS DCE and it's results, an additional sub-section of this section takes the results at face value, and discusses their substance and potential applications, as well as prospective follow-up work. The chapter then closes with some concluding thoughts related to the original research questions on the feasibility, validity and reliability of DCE in Malawi.

6.6.1 Content and respondent issues

Perhaps the main issue regarding the content of the DCE with regard to its influence on how respondents completed the questionnaire, was the use of coloured cards to signify the different levels of the attributes (red: 'bottom'; yellow: 'mid' and green: 'top'). This was done to aid respondents, many of whom who were illiterate, complete the choice tasks (§6.3). However, as detailed in §6.5.1, it is likely that respondents were overly influenced by this colour-coding, with some interviewers perhaps also contributing to this influencing more than others. Especially with regard to the pilot study, where 'irrational' responses were more fully-investigated (§6.2), it is possible that some of the apparently 'irrational' responses may have been due to the respondents not considering the levels - i.e. only considering the areas of quality of life. Also, in cases where the ranking was always green ('top' level) better than yellow ('mid' level) better than red ('bottom' level), it is possible that only the levels rather than the attribute content of the attribute-levels were considered - the data from such cases would seriously affect the results

as it would not contain any information regarding the respondent's preferences for the quality of life attribute-levels, and would therefore need to be excluded from the model. Although insufficient qualitative data was collected to establish the extent of the presence of either of these possibilities, given that the model results appear plausible (see § 6.5.3 on page 163), it could be that their presence was minimal.

It would be useful for future studies to probe the fine line between visual aids for illiterate respondents that help them complete a choice task, and visual aids that unduly influence, or 'engineer', such respondents' choices. Given that the qualitative information from the 'think aloud' pilot studies on how respondents completed the choice tasks (see §6.2) hints that they perhaps did not hold prior opinions regarding the choices, and that they, therefore, may often have 'constructed' their preferences during the choice task, it is likely that this balancing act may be difficult, and more likely to be dominated by the visual aids 'constructing' the respondents choices. Indeed much research has shown that the presentation of a choice task often greatly influences, and sometimes completely determines, the outcome - the choices that respondents make. Pertinent examples include the influence of framing (of which the coloured cards are an example), and of anchors, both of which 'bias' responses via their effect on the decision-making heuristics employed by the decision-maker, as detailed in §5.4. Another example of possible framing effects in this study is the following. As respondents only saw 7 of the 81 attribute-levels, their choices would've been affected by the context of the 7, rather than the 81. If they all saw all 81 (in a series of choices) it is possible that the broader frame, enabling 'joint' rather than 'single' evaluation, may have altered their preferences (in the extreme, as noted by Kahneman (2011i), preference reversals can occur).

Respondents may employ a variety of heuristics when completing choice tasks; for example, those discussed in §5.5.2. There may be cut-off levels of attributes below or above which respondents change their behaviour regarding which option they choose. Given the nature of the choice task in this study involved a choice between attribute-levels, and that only a fraction of the total attribute-levels were shown to each respondent, it was not possible to investigate the influence of such potential cut-off levels, or the degree to which related heuristics, such as 'Take the best' (see Table 5.1: row iii) on page 135), were employed. The model results (§6.5.3) do indicate the relative importance of each attribute-level though.

Overall, given the evidence in §6.2, and §6.5.1, and considering the above, and the evidence in §5.4, it is more plausible that 'bounded rationality' rather than 'Random Utility Theory' is a more accurate theoretical framework for this BWS DCE; and also for DCE, choice modelling, and decision-making in general. Methods for formally modelling the influence of the heuristics and biases of bounded rationality (an example would be the mathematical function for prospect theory, shown in Figure 5.2 on page 127) are still in their infancy (Hess and Daly, 2010). This is perhaps because RUT, and other 'neoclassical' attempts to model human decision-making and economic behaviour, still hold sway, despite the growing mountain of empirical evidence contradicting them produced by behavioural economists and other social scientists measuring how decision-making works in real-life (see §5.4).

6.6.2 Analytic issues

Notwithstanding the objections of behavioural economics laid out above, there are a number of issues related to the modelling of the choice responses within a RUT framework. Most of the issues surrounding the modelling of the BWS DCE results were discussed as they arose, when the analyses were chronicled in the subsections of §6.4. With regard to the statistical design of the BWS DCE, the main issue was that the, admittedly unwieldy and unconventional, design of a pool of 81 attribute-levels from which only 7 were shown to each respondent, meant that it was difficult to calculate a statistically efficient design - and also difficult to estimate precisely what the efficiency was with respect to the, as yet unknown, optimal design. The unconventional design was chosen to pursue the aim of estimating preferences from as wide a range of quality of life attributes as possible; and, since the experienced levels of the same attributes were measured for the same respondents as part of the WHOQoL-BREF study (§4), to estimate a crude utility function based on the respondents preferences for the quality of life attribute-levels too. Model estimation using the newly-developed SBWMNL (Lancsar and Louviere, 2008; Lancsar, 2011) fit the data better than the alternative rank-ordered logistic regression, which, unlike the SBWMNL, does not account for 'worst' choices or consider the sequential nature of the best and worst choices that respondents made in this study. Unlike many DCE in health, and certainly earlier studies, preference heterogeneity was also adequately tested for in this study, the resulting overwhelming rejection of the null hypothesis of homogeneity indicating that it was highly likely that the women's group members, non-members, and control area women all had different preferences for the quality of life attribute-levels.

Additional considerations in choice modelling, which are beyond the scope of the current study, include the following. Segmentation of choice attribute variables by socio-demographic groups (nested logit models) e.g. for income groups if income is hypothesised to affect judgment of the importance of attributes (this is beyond the scope of the current study due to insufficient sub-group sample size as explained in §6.4.4 above). Predicting intervention uptake rates: the prediction of uptake can be determined by calculating the probability that an individual will choose an intervention with a specific set of attributes over other interventions with different sets of attributes. Although the preference-weighted quality of life attribute data obtained in this study does permit such modelling, without measuring the actual (quality of life) attributes a specific intervention is likely to yield, such modelling will not have practical applications, and therefore was not considered in this study.

Alternative models to the conditional logit, which could theoretically better represent real-life choice behaviour, are the nested logit, mixed logit, and latent class models (Amaya-Amaya et al., 2008). As a result of any correlations between the choices made by the same participant, the optimal model may also have random effects, by individual. In order to specify such random effects, alternative models to conditional logistic regression (which has fixed-effects), are required. Hierarchical Bayesian models could be developed. These involve combining information on the aggregate preference distribution (treated as a 'prior') with individuals' choices, to calculate conditional estimates of individual respondents' preferences ('posterior' distributions). Considering the use of the SBWMNL model in this study is justified by its modelling of the

sequential best worst nature of the choice task, and the general significance and face validity of the model results (e.g. the coefficients all having the expected signs, see §6.5.3), and also considering opportunity costs of, and limits to, analysis, and that it is likely that more substantive theoretical issues remain in the estimation of comprehensive utility functions - including whether they should be estimated in the first place - see §8.6, the exploration of these additional models was considered beyond the scope of this study.

A further issue surrounding the estimation of the regression equation is whether to include dummy variables representing different choice sets (to control for differing perceptions of choices by respondents, dependent on the choice set seen) (Baltussen et al., 2007). This would be required, for example, in situations where the particular combination of attributes and levels of the choice set shown affects the respondent in some way in addition to the information contained in the individual attributes and levels (Louviere et al., 2008). Such situations are more likely when choice sets are indicated to be particular situations, and are labelled as such. Given the more abstract nature of the choice task in this study, and absence of choice-set labelling, it is unlikely the inclusion of dummy variables representing different choice sets was required.

6.6.3 Current and future applications of the BWS DCE results

Notwithstanding the various caveats detailed above, using the results of the BWS DCE to preference-weight the WHOQoL-BREF scores has yielded inconclusive results with respect to differences in quality of life between the women's group members, non-members in the same village, and women in control areas. Each study arm has higher quality of life in some domains and facets, but lower in roughly an equal number, though without seeming association to potential village-level effects or capabilities, as detailed in §6.5.5. Therefore, the implications of the results of this study are unclear. They are discussed in relation to the other empirical results of this thesis in §8.1-§8.3.

The WHOQoL-BREF quality of life attributes found to be most important from the BWS DCE were compared and contrasted to those found important in the simple WHO-recommended method of weighting on a scale of 1 to 5 without trading. The former is preferred firstly, due to it being dependent on respondents trading-off attributes against each other, and consequently giving a wider range of 'importance' scores; and secondly, due to it involving valuation of the levels of the quality of life scores, enabling the calculation of a continuous-scale utility function, and the applications such a function allows. The preference-weighting from the BWS DCE could also be compared and contrasted to those highlighted by the thematic analysis of the focus group discussions (see §4.1.5). However, the FGD did not yield enough information to explore the reality of the trade-offs between quality of life attributes that people are willing to make and accept, therefore precluding an assessment of the validity of benefit transfer between attributes. Nevertheless the results described in this chapter, taken as representative of the quality of life of the respondents, provide some insights into how rural Malawian women see different areas of quality of life as being more or less important. With further work to refine them quantitatively, and elaborate on them qualitatively, and with reference to similar studies in other populations, future versions of this BWS DCE study could provide suggestions of

potential adaptations to preferences due to the status quo of rural Malawian life. Such work, for example, could tell us, that given certain conditions in a village, or household, or a certain intervention, respondents come to value certain areas of quality of life more than others that they did previously. Or, it could highlight differences in preferences for quality of life attributes and levels due to village, household, intervention, or other socio-economic effects, between different populations. Such work could be applied, as in this study, to determining weightings for utility functions. As such, it could be applied to economic evaluations seeking to improve preference-weighted utility, perhaps as a complementary goal to improvement of measures of capability, or other more 'objective' measures that are less dependent on preference-adaptation and the desires of the current 'experiencing self'. These alternatives for economic evaluation and health and social policy are discussed fully in §8.

Further work on assessing the value of the women's group intervention from the perspective of its intended primary beneficiaries (rural Malawian women) is presented in §7.

6.6.4 Conclusion

In conclusion, this study has shown that DCE are feasible in Malawi. It has also suggested that they may require extra care in their execution, in order to avoid undue influence of visual and other aids, aimed at enabling illiterate, semi-literate or otherwise less predisposed respondents, to complete the often-demanding tasks. The results in this study have also not ruled out the validity of DCE in Malawi. However, they have called into question the validity of DCE in general, by bringing into question the larger issue of whether RUT is an accurate framework for measuring human economic behaviour (also see §5.4). The question of whether DCE in Malawi can be reliable remains open, as test-retest reliability was not investigated, due to resource constraints necessitating the study being conducted at a single time-point only. Overall, the evidence in support of DCE in Malawi and similar low-income settings is therefore perhaps mixed. However, as the first known DCE with ordinary rural villagers in Malawi, and as one of the few applications of best-worst scaling and the associated SBWMNL model in the literature, this study has opened the door for potential follow-up studies looking at a variety of aspects of research aimed at capturing people's preferences for complex phenomena in low-income settings. Perhaps it will be this opportunity, rather than the specific results of the study, that becomes its main return on investment.

Chapter 7

Contingent Valuation of women's groups

To complement my work examining how the Malawian women's groups aimed at reducing maternal and neonatal mortality may also affect quality of life (chapter 4), and how different aspects of quality of life are valued (chapter 6) I also sought to estimate how much women's group members, non-members in the same village community, and women in other communities value the women's groups. Given that, at the time of writing in 2012, external funding for MaiKhanda is phasing out[1] this sub-study also has a practical application in assessing the feasibility of co- or sole-payment by community members of the women's groups going forward. This chapter begins with a very brief background and rationale of the CV study, before moving on to describe the study in detail. The results are then presented and discussed, especially with regard to their robustness and implications.

7.1 Background

As far as I am aware from an extensive review of the contingent valuation literature (Carson and Hanemann, 2005) and an extensive search of health and economics journal databases, this study constitutes the first contingent valuation study in Malawi. As such I hope it stimulates further work and contributes to economic evaluation of other interventions in Malawi.

The immediate use of this study will be in the valuation of the women's groups informing the policy of MaiKhanda and perhaps even district or national level health ministry (or other ministry) budgeting with respect to possibilities for funding the existing groups or a scale-up of the groups to other areas. Given that the women's group intervention could have many non-health benefits (§4) and that this study is also asking non-members and those in distant (control) areas for their valuation of the groups and therefore hoping to also capture 'non-use value' of the groups, both of which have been largely overlooked in previous studies (Olsen and

[1] current funding for MaiKhanda from February 2012 to January 2015 is half of the previous funding

Smith, 2001), this study hopes to also add value to the contingent valuation literature in health economics.

7.2 Methods

The aim of this study was to investigate how much rural women in Malawi are able and willing-to-pay (WTP) for the MaiKhanda women's group intervention. I designed the study to explore differences in WTP between women's group members, non-members in the same village and women in control villages (of the Colbourn et al. (2012b) RCT), and to examine the influence of respondent characteristics and payment vehicle on WTP. The content of the questionnaire and elicitation format of the question asking for the respondents WTP were informed by the contingent valuation literature, especially the best practice highlighted in the extensive review by Carson and Hanemann (2005) and in reviews of CV studies in low-income countries by Whittington (1998)(2002), and a pilot study was conducted to develop the questionnaire, especially with regard to an appropriate payment elicitation format.

All statistical analyses were conducted using Stata 12.1 for Mac (StataCorp, 2011a), see Appendix V for the Stata .do-file code.

7.2.1 The Sample and Survey

A random sample of 36 women in each of the 3 comparison groups (members, non-members and controls) was identified for the survey (see § 4.1.2.2 on page 79 for random selection procedure). The survey was conducted in conjunction with the quality of life (chapter 4) and best-worst choice studies (chapter 6), with one in five women being given the contingent valuation questionnaire. Questionnaires were completed by face-to-face interview, which in addition to being important for the understanding of less literate respondents, yields more reliable data (Davis and Whittington, 2004). The interviews were conducted in Chichewa[2] by Malawian research assistants, whom I trained, placing special emphasis on restricting their explanation of the task to the information in the questionnaire, in order to avoid pitfalls identified in the literature (Whittington, 1998, 2002; Carson and Hanemann, 2005). As with the other parts of my study, in order to improve accuracy of data collection and speed of data processing, the questionnaire was administered on a PDA handheld computer after being programmed into Pendragon Forms 5.1 (see Appendix K, screens 78-126; for the final version of the English paper questionnaire (Appendix T on page 426) translated into Chichewa and programmed into the PDA). A paper-based pilot study of 12 participants was carried out first to test and refine the questionnaire (see §7.3). The following sub-sections describe the different aspects of the contingent valuation study, each providing justification for the inclusion of the different sections and questions on the final questionnaire.

[2]like the other surveys conducted for this Ph.D., the CV questionnaire (Appendix T) was translated into Chichewa beforehand

7.2.2 Investigation of variables associated with WTP

Following Borghi and Jan (2008) and taking into consideration the Malawian context (National Statistics Office (NSO) [Malawi] and ORC Macro [USA], 2005; National Statistics Office [Malawi] and UNICEF, 2008; National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011), I hypothesised the women's WTP would vary depending on socio-demographic variables and variables associated with the women's groups and maternal and neonatal health as detailed in Table 7.1, which also details the coding used for the regressions testing the hypotheses. For the Household Income, Education and ANC visits variables there are plausible hypotheses for differences in WTP in both directions (Table 7.1), which could possibly cancel each other out.

7.2.3 Investigation of payment vehicle preference

Given the prominence of the informal non-cash economy in Malawi (see e.g. National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011, p.32), I hypothesised that some respondents would be reluctant to contribute money despite being willing-to-pay. Following others Borghi and Jan (2008) and Swallow and Woudyalew (1994), I therefore gave respondents the choice of three methods of payment: money, time or maize flour ("ufa" in the local language, Chichewa). Given problems with assuming exchange rates between the payment vehicles (§7.4.3) I was not able to examine the effect of payment vehicle on WTP responses.

7.2.4 Visualisation of the task

Open-ended questions are not desirable for public goods as people need to know what others would pay and also need a rough idea of the value of an unfamiliar new good; therefore the payment card approach (where a respondent states WTP with reference to, e.g. 5, set prices) is often recommended (Carson and Hanemann, 2005). Although the payment card approach yields more data from the same sample size and avoids confusion over possible different prices for a good (Mitchell and Carson, 1981; Rowe et al., 1996), I felt that such an approach would restrict WTP responses too much and may also distort results by being incompatible with the maximum some respondents were able to pay. During piloting I also found even including guideline set amounts as proportions of total expenditure biased respondents towards the specific guideline proportions shown (§7.3). I therefore chose to present possible WTP responses as being bounded by zero and the maximum respondents could afford; the latter determined by preceding questions on monthly household income, time spent on other activities in a week, and total monthly use of ufa for the different payment vehicles respectively (see section E of the questionnaire in Appendix T). The use of the PDA enabled automatic calculation and presentation of each respondent's upper limit. The minimum (zero) and upper limit WTP were displayed on each end of a line (Figure 7.1) to aid respondents visualisation of the WTP task. Respondents who had heard of the women's groups were also asked questions about what they thought about the women's groups and what they thought the specific benefits of and problems with the groups might be, and how much they thought a group costs to run in a month (section B, Appendix T) to prime them for the valuation task. These respondents were also primed by the description of the women's groups

Table 7.1: Hypothesised effects of socio-demographic, intervention and health variables on women's WTP

Variable	Coding	Hypothesised effect on WTP
Study arm	1 Women's group member* 2 Non-member in the same village 3 Control area woman analysed as a categorical variable	Higher WTP in members than non-members as they may value the groups more given that the non-members are in the same village and had an opportunity to join but were yet to join. Also lower WTP in control area women as they are less familiar with the groups.
Household income	Continuous variables for each of money, time and ufa, and for all three combined into a single metric of money (see §7.4.3)	Higher WTP as more able to pay (except for higher time expenditure) WG are perceived to be for the poor so that poor women would therefore be WTP more of their income than richer women.
Education	0 None* 1 Primary 2 Secondary 3 Tertiary	More educated women have higher WTP as they are more able to benefit from the WG (see literate below) More educated women have lower WTP as they are less in need of help from the women's groups.
Literate	0 No* 1 Yes - can read only 2 Yes - can write only 3 Yes - can read and write Also as categorical variable	More literate women have higher WTP because they are more able to benefit from WG
Marital status	1 Single 2 Married* 3 Living as married 4 Separated 5 Divorced 6 Widowed	No hypothesised differences
Ill	0 Not ill* 1 Ill	Ill women have higher WTP as they are more in need
Age	Age in years as continuous variable, calculated as days old from survey date minus date of birth	Younger women have higher WTP as more able to benefit
WG meetings attended	number of meetings (integer)	Those who attend more meetings have higher WTP as they value the WG more for it
How much does WG cost monthly	Continuous variable (analysed per 1000MKW)	Those who think the WG cost more to run each month are willing-to-pay more
Perceived risk to MNH	0 Low risk* 1 High risk	Those who perceive they are at high risk of maternal and neonatal health problems have higher WTP than those who perceive they are at low risk
ANC visits	number of ANC visits (integer)	Those who attended more antenatal care sessions will have lower WTP as they will perceive the need for WG to be less Those who attended more antenatal care sessions will have higher WTP as they will see MNH (the focus of WG) as more important
Previous place of delivery	1 Home 2 TBA 3 Health Facility* 4 Road analysed as a categorical variable	Higher WTP in those delivering at a health centre as higher perceived risk

*Reference category for categorical variables
WTP = Willingness-To-Pay (for the women's group intervention) WG = Women's group MNH = Maternal and Neonatal Health
TBA = Traditional Birth Attendant ANC = Antenatal Care

Figure 7.1: Visualisation of lower and upper bounds of WTP in CV task

provided in the scenario (§7.2.5). Those who had not heard of the women's groups were only primed by the information in the scenario, which nevertheless, by its design should have given them an idea of how they would value the women's groups.

7.2.5 The scenario

The potential phasing-out of MaiKhanda's funding for the women's groups in 2012[3] provided a highly realistic scenario in which respondents could be asked to support the intervention from early 2012 (the full text of the scenario, translated and read out to respondents in Chichewa, is provided in English in section D of the questionnaire, included as Appendix T; the Chichewa version on the PDA is screenshots 91-97 of Appendix K). Although, for the purposes of ensuring incentive compatibility and avoiding the free-rider problem it is important that, as well as being realistic, the CV scenario not be one of voluntary payment (Carson and Hanemann, 2005), the reality in rural Malawi, like other rural developing world settings (Borghi and Jan, 2008), is that out-of-pocket payments at point of use rather than tax or insurance-based payment vehicles are common. Voluntary payments are also more appropriate when considering the local nature of the women's groups and the fact the local group would exist only if funded by local contributions. The scenario therefore sought voluntary payments (see section D, Appendix T). To reflect the on-going regular costs of the women's group intervention, respondents were asked to contribute regularly: monthly for cash payments and payments in ufa (given monthly household budgeting is common in rural Malawi), and weekly for payments in time (given thinking about hours spent on different activities per week is intuitively easier than thinking about hours per month and

[3]at the time of the survey in the first half of 2011, there was still considerable uncertainty as to whether MaiKhanda would be funded at all after February 2012

more accurate over a range of regular activities than hours per day).

7.2.6 Justification of WTP responses

Respondents were also asked open-ended questions to investigate why they chose to, or chose not to, contribute the amount they did (section F, Appendix T). The respondents previous knowledge of, involvement with and opinion of the women's group intervention, and their reasons for supporting or not supporting the intervention, were all considered in this analysis, which was thematic and aimed to determine what aspects of the women's groups the women were valuing. Before presenting the results I discuss the experiences of the pilot studies, carried out to refine the questionnaire.

7.3 Pilot Study

I refined the contingent valuation questionnaire (Appendix T) by testing 3 different versions on 4 women each, on two separate occasions, in rural villages in Lilongwe district in November 2010. On the first occasion two similar versions of the questionnaire were tested[4], with different versions of the payment task: the first with guiding amounts at three-quarters, half and one-quarter of total expenditure in money, time (total expenditure being 160 hours a month, the equivalent of a full-time job) or maize flour (Figure 7.2a); the second with guiding amounts at one-quarter, one-eighth, and one-sixteenth of total expenditure (Figure 7.2b). Guiding amounts were tested originally due to suggestions from the literature that such 'payment card' approaches are useful in order to give respondents some idea of amounts to pay (Whittington, 1998; Carson and Hanemann, 2005). However, as may be expected due to anchoring effects (Kahneman, 2011c), the four women answering the questionnaire with larger guiding proportions (the first version) were willing-to-pay a greater proportion of their total expenditure (10%; 2%; 13%; 14%) than the four answering the questionnaire with smaller guiding proportions (4%; 1%; 1%; 6%). On the second piloting occasion I revised the questionnaire in light of the evidence of framing effects, so that the guidance for payment was open-ended, only bounded by 0 and total expenditure i.e. there were no prompts or guiding proportions (Figure 7.2c). The four respondents answering this version of the questionnaire indicated they were willing-to-pay 3%, 6%, 2% and 6% of their total expenditure, respectively. I did not include a 'don't know' option for the WTP amount as I felt this unnecessary, and from the literature it appears inclusion of such an option would be counter productive due to the loss of data it often results in and the observation that its omission does not usually harm the quality of the results (Krosnick et al., 2002).

Of the 12 respondents in the pilot study, 9 chose to pay in maize flour, 2 in money and 1 in time. All of the pilot questionnaires also asked about total expenditure in terms of money (in the local currency, Malawi Kwacha (MKW)[5]), divided into expenditure on food, rent, transport,

[4] i.e. a 'split-sample' approach was used, as advocated by Whittington (2002)

[5] during the study period there was a fixed exchange rate of 140MKW per US$1; the exchange rate with the British pound varied between 230-280MKW per £1

Figure 7.2: Versions of the payment question

(a) version one: guiding amounts as quarters of total expenditure

Using the figure below as a guide (you can state amounts in between those given on the figure), how much are you willing to pay *every month* for the Women's Groups to continue running in 2012? [Upper limit should be total expenditure in previous month – question 10 g)]
Interviewer should start at bottom quarter and move up payment card if respondent agrees they would pay that amount. If the respondent says 'No' to an amount they should be asked what amount in between the amount they said 'Yes' to and the amount they said 'No' to that they would pay. It is already assumed that the respondent will pay something (more than 0K) as they said 'Yes' to question 14.

Total expenditure _____

Three quarters _____

Half _____

A quarter ____

0K

(b) version two: guiding amounts as quarter, eighth, sixteenth of total

Total expenditure _____

One-quarter _____

One-eighth _____

One-sixteenth ___

0K

(c) final version: no guiding amounts (zero to total)

Using the figure below as a guide (you can state amounts in between those given on the figure), how much are you willing to pay *every month* for the Women's Groups to continue running in 2012? [Upper limit should be total expenditure in previous month – question 10 g)]
Interviewer should frame the amount by drawing the scale from 0K to total expenditure (q10 g) below and explain that they should choose an amount between these two points on the scale. It is already assumed that the respondent will pay something (more than 0K) as they said 'Yes' to question 14.

0K_____

education, healthcare, and 'other things'), with WTP as proportion of total expenditure then calculated from maize or time expenditure assuming a fixed exchanged rate of 25MKW per Kg of maize flour and 25MKW per hour. This despite framing the payment question in terms of total amounts of maize flour or time (which, using these fixed exchange rates, are not equivalent to total monetary expenditure from the 'total expenditure' question[6]), when either of these payment vehicles were chosen. In the final version of the questionnaire the questions determining total expenditure were asked following the choice of payment vehicle and were asked in terms of that payment vehicle, e.g. how much maize flour did your household use last month on: a) feeding members of your household, b) feeding other people, c) selling to other people, d) giving to other people (e.g. in exchange for something else), with the sum of a)-d) being the total expenditure and upper bound for the subsequent payment question (see section E of Appendix T).

Another notable finding from the pilot study was that all twelve were willing-to-pay for the women's groups; however, all but one were women's group members (and that one knew other members and wanted to join), and all had good reasons for paying to support the women's groups. These reasons included reduction of maternal deaths, passing knowledge to the next generation, the groups being personally important, beneficial to the members and important to the community. All of the women except one also indicated that they found it easy to answer the payment question, the only women indicating they had difficulty saying that they had concerns over their ability-to-pay rather than difficulty with the questionnaire or the survey methodology. The women were also able to initially state the things they thought were good and bad about the groups (section B of the questionnaire, Appendix T) giving a variety of responses; although the negative aspects were exclusively stated as a lack of material things for the groups (e.g. farm inputs, bicycle ambulances, maize flour) rather than negative aspects of the groups or the interventions themselves. These background questions were intended to get the respondents thinking about how they value the women's groups, which is important to improve accuracy of the payment task (Carson and Hanemann, 2005). Finally, the answers to the question: How much do you think a Women's Group costs to run every month? (question 8, Appendix T) were interesting as they ranged from 2,000MKW to 100,000MKW (median: 9500MKW, mean: 23833MKW) indicating the women were on the whole uncertain how much it costs to run one women's group every month.[7] There did not appear to be a relationship between the responses to these questions and the women's WTP as a proportion of total expenditure in this small pilot sample of twelve respondents. I explore the relationships between contextual information and WTP further in the main study (§7.4.4.6).

[6] in the main study I abandoned the use of such fixed exchange rates, see §7.4.3

[7] Based on actual costs incurred by MaiKhanda, assuming one supervisor per nine facilitators (paid 120,000MKW per month) and one facilitator per nine groups (given an allowance of 5000MKW per month), capital expenditure on one motorbike per supervisor (i.e. one for 81 groups), one computer per three supervisors (i.e. one for 243 groups), and one bicycle per facilitator (i.e. one for 9 groups), each being divided into 36 monthly payments, and supporting office and management costs, yields an estimate of 4000MKW to run one group for one month. Given an average of 20-30 members per group, WTP would therefore need to be in the range of 130-200MKW per month to cover the running costs of the group.

Table 7.2: Socio-demographic characteristics of respondents to Contingent Valuation study

	WG members (n=36)		non-members in same village (n=34)		control village women (n=36)		Total (n=106)	
	n	%	n	%	n	%	n	%
Marital Status								
Single	0	0%	0	0%	0	0%	0	0%
Married	31	86%	29	85%	30	83%	90	85%
Living as Married	1	3%	0	0%	0	0%	1	1%
Separated	1	3%	0	0%	0	0%	1	1%
Divorced	1	3%	3	9%	5	14%	9	9%
Widowed	2	6%	2	6%	1	3%	5	5%
Education								
None	4	11%	11	32%	7	19%	22	21%
Primary Standard 1-4	10	28%	10	29%	14	39%	34	32%
Primary Standard 5-8	14	39%	10	29%	8	22%	32	30%
Secondary	8	22%	3	9%	6	17%	17	16%
No answer	0	0%	0	0%	1	3%	1	1%
Literacy								
Can't read or write	9	25%	16	47%	15	43%	40	38%
read only	4	11%	2	6%	2	6%	8	8%
write only	1	3%	0	0%	1	3%	2	2%
read and write	22	61%	16	47%	17	49%	55	52%
	mean	se(mean)	mean	se(mean)	mean	se(mean)	mean	se(mean)
Ill	36.1%	8.1%	26.5%	7.7%	8.3%	4.7%	23.6%	4.1%
Age	37.3	1.9	36.7	1.9	31.4	1.30	35.1	1.0

7.4 Results

7.4.1 Respondent Characteristics and Contextual information

106 women completed the questionnaire, (36 WG members, 34 non-members and 36 controls). 85% of respondents were married, 21% had no education, 32% primary standard 1-4, 30% primary standard 5-8, 16% secondary and 1 (3%) did not answer the education question (Table 7.2). The average age of respondents was 35 (s.e.: 1.0); 24% were currently ill; and, 38% were illiterate and another 10% semi-literate (illiteracy was highly correlated with education). There were some differences in characteristics between the three study groups, notably, non-members being less educated and less literate, and controls being slightly younger and less ill (Table 7.2). The importance of these differences to the WTP results are dependent on the association between these variables and the amount respondents were willing-to-pay (see §7.4.4.6).

Other contextual information relevant to the contingent valuation scenario is presented in Table 7.3. As expected nearly all of the women who lived in the same village as the women's groups but were not members had heard of the women's groups, whereas not many of the women in control areas had heard of the women's groups. The women's group members indicated that they had all heard of the groups and had also all attended the women's group meetings at least once, also as expected. Some of the non-members (9 out of 30 who had heard of the MaiKhanda women's groups and therefore were asked (and answered) this question) and some of the control women (2 out of only 7 who were asked (and answered) this question) also indicated that they

had attended a MaiKhanda women's group. For the control group women this is particularly surprising, although it is always possible that these two women did actually attend meetings in the women's group areas, perhaps whilst they were visiting friends or relatives there. All but one of the non-members and the control group women answering question B3 on whether they knew anyone who was a women's group member (which was asked only to those who answered question A2 that they had never attended a women's group) indicated that they did. Assuming those indicating that they did not ever attend a women's group attended zero women's group meetings yields distributions of numbers of meetings attended for each of the three comparison groups in line with what would be expected[8]: the women's group members attending an average of 10 meetings and the few in the other study groups who indicated they had attended meetings, attending very few on average (Table 7.3). As also found in the pilot study, the responses to question B8 *How much do you think a Women's Group costs to run every month?* varied quite considerably. Although the responses of non-members were on the whole higher than members, the distributions of the responses among the two groups were not significantly different. The responses to question C10 *Do you think the risk to Maternal and Neonatal Health in your community is high or low?* are interesting as they indicate clear differences between each of the three groups with a much lower proportion of the women's group members thinking their community is at high risk, than non-members in the same community and women in control areas, who had the highest proportion thinking their communities were high-risk; the differences between all three arms being statistically different. Perhaps the proximity to a women's group biases the subjective experience of risk to MNH in the community? The distributions of number of antenatal care (ANC) visits during the women's last pregnancy were similar in all three comparison groups, although control area women indicated slightly fewer visits (Table 7.3). The data on place of delivery (question C12) is also interesting as it again shows slightly higher proportions of women's group members and non-members, than control group women to have delivered their last baby at a health facility. However, these differences are not statistically significant and health facility delivery rates are above 80% in all three groups.

The qualitative information gained from questions B5, B6 and B7 (see Appendix T for questionnaire), is also useful contextual information. All of the women's group members, nearly all of the non-members, but only about a fifth of the control area women (who did not know the groups), answered question B5: *Overall, What do you think of the Women's Groups?* The vast majority of responses were positive with answers typically concerning: the importance of the women's group in terms of encouraging health facility delivery instead of delivery by Traditional Birth Attendant (TBA), e.g.:

"The groups have helped us appreciate rushing to the hospital once we or a child are sick" [WG member, id=5]

"Through the messages MaiKhanda groups spread I have learn together with others that delivering at TBAs is a risky behaviour" [WG member, id=10]

[8] at the time of the survey (25/01/2011 to 03/06/2011) the women's group action cycle of at least 16 meetings (see Figure 1.1 on page 21) was complete for most groups

Table 7.3: Contextual characteristics of respondents to Contingent Valuation study

	WG members (n=36)			non-members in same village (n=34)			control village women (n=36)			Total (n=106)		
Question[a]	n	% non-missing	% inc. missing	n	% non-missing	% inc. missing	n	% non-missing	% inc. missing	n	% non-missing	% inc. missing
A1. Heard of Women's Groups												
Yes	36	100%		30	88%		7	19%		73	69%	
No	0	0%		4	12%		29	81%		33	31%	
A2. Ever attended Women's Group[b]												
Yes	36	100%		9	30%	26%	2	29%	6%	47	64%	44%
No	0	0%		21	70%	62%	5	71%	14%	26	36%	25%
missing	0	0%		4		12%	29		81%	33		31%
B3. Do you know anyone who is a WG member[c]												
Yes				20	95%		4	80%		24	92%	
No				1	5%		1	20%		2	8%	
C10. Risk to MNH in their community												
Low	32	89%		20	59%		6	17%		58	55%	
High	4	11%		14	41%		30	83%		48	45%	
C12. Delivery place of last baby												
Home	1	3%		1	3%		4	11%		6	6%	
TBA	2	6%		2	6%		2	6%		6	6%	
Health Facility	32	89%		30	88%		29	81%		91	86%	
Road	0	0%		1	3%		0	0%		1	1%	
Never Delivered	1	3%		0	0%		1	3%		2	2%	
B4. Number of Women's Group meetings attended[d]	min, max	mean	se(mean)	min, max	mean	se(mean)	min, max	mean	se(mean)	min, max	mean	se(mean)
of those who've attended groups (answered A2 as Yes)	1, 24	9.8	1.0	1, 14	4.6	1.6	1, 9	5.0	4.0	1, 24	8.6	0.9
whole sample, assuming 0 for those who've 'never attended'		as above		0, 14	1.2	0.5	0, 9	0.3	0.3	0, 24	3.8	0.6
B8. How much does a Women's Group costs to run in a month? MKW (wg: n=28; non: n=19; control n=1)	0, 60000	15214	3502	2000, 100000	22000	6675	70000	70000		0, 100000	19042	3503
C11. Number of ANC visits during last pregnancy (wg: n=33; non: n=31; control n=32)	0, 8	4.7	0.3	1, 13	4.8	0.4	0, 8	4.0	0.3	0, 13	4.5	0.2

[a] numbered as on questionnaire (see Appendix T) [b] only asked to those who answered Yes to question A1 [c] only asked to those who answered No to question A2

[d] only asked to those who answered Yes to question A2 ANC = Antenatal Care MKW = Malawi Kwacha ($1 = 14 MNH = Maternal and Neonatal Health

"The groups have benefited us a lot in that they encourage us to go in good time to the hospital for delivery" [WG member, id=35]

"I like what the groups are doing. Women now go for antenatal clinic and they deliver at hospitals not at TBAs or at home" [WG member, id=105]

"Its a good group since it provides ambulance bike to ferry the sick to hospital" [non-member, id=265]

; the importance of the women's groups in terms of the knowledge they bring, e.g.:

"They are good and educative especially to those who are still reproductive" [WG member, id=110]

"We have learnt a lot and I would like to see the groups continue. We have learn about maternal health and so many other things" [WG member, id=125]

"The groups are very educative; promote good health" [non-member, id=220]

"I would like to join the group since it teaches about child bearing so I want to know more" [non-member, id=335]

"They teach good mothering ability" [control, id=510]

; beneficial effects in terms of safe motherhood, e.g.:

"The groups discuss how to attain good health; to have a safe delivery when pregnant" [WG member, id=60]

"They are very helpful in issues of safe motherhood" [WG member, id=100]

"The groups work towards good health of the mother and the baby" [non-member, id=245]

"The groups have helped a lot of women to appreciate the importance of going for antenatal clinic" [WG member, id=45]

"They taught us on child delivery; child spacing; child care and development; prevention of diseases due to proper child spacing" [non-member, id=285]

; and reduced mortality, e.g.:

"maternal and infant mortality has decreased" [WG member, id=165]

"They are good groups that work towards reducing death of babies" [non-member, id=225]

These perceptions of the women's groups were shared between women's group members, non-members and control women alike[9], however, the latter two groups understandably were also less aware of the women's groups so less able to comment, e.g.:

[9]the quotes in this summary are roughly proportional to the number of responses given; both in terms of the theme of the response and within each theme, the study arm of the respondents

"I really don't know that much because am not involved" [non-member, id=205]

"I wish am one of the group members so that am aware of what is shared in the group" [control, id=535]

The only negative response to question B5 was from a non-member who was not willing-to-pay:

"They are not beneficial to me. There is no nurse and people are delivering from homes. They come back from hospital to deliver at home" [non-member, id=255]

Further elaboration on the perceived benefits of the women's groups, provided by around half of WG members and non-members[10] who answered 'Yes' to question B6: *Do you think the Women's Groups have benefits you have not already mentioned? If so, what are these?* included a lot of responses similar to those quoted above, indicating that these themes were the most popular. Notable additional statements included those on the benefit of the women's groups in terms of it providing physical benefits such as clothes/covering for pregnant women, farm produce and especially transport to the hospital:

"They even help on transporting pregnant women to the hospital during labour" [WG member, id=90]

"The group uses its funds when pregnant mothers have problems and they carried one woman (a non member) to the hospital when she did not have anyone to help" [non-member, id=330]

In response to question B7: *Do you think there are problems with the Women's Groups that you have not already mentioned? If so, what are these?* around one-third of women's group members answered positively, with only a very small minority of non-members and controls also answering positively. Typical answers were similar to those of the pilot study (§7.3), citing lack of provision of materials such as T-shirts, funds for the groups to use:

"We do not get enough aid/funds" [WG member, id=135]

"The group lacks funding to cater for its needs" [non-member, id=235]

or transport, with several responses indicating the hospital was too far away (often due to a lack of provision of a bicycle ambulance), e.g.:

"The health centre is still far though we are encouraged to deliver there" [WG member, id=50]

"Lack of bicycle ambulance for use during emergency" [WG member, id=80]

"There is a problem with transport to the assigned venue" [control, id=535]

[10] only one control woman answered yes to this question and stated: *"Encouraging women to deliver in the hospital*" [control, id=535]

Other responses included problems with participation in the group:

"Poor participation from few selected individuals" [WG member, id=45]

or members being disruptive or not abiding to what the groups agreed to:

"Sometimes misunderstandings may raise resulting into minor conflicts" [non-member, id=345]

One respondent indicated that they thought the groups were not helping women much, as mortality was still high in group members:

"Most of them die due to pregnancy related problems" [control, id=475]

The full thematic analysis of the responses to questions B5, B6b and B7b, which was developed from the framework of the thematic analysis conducted for the focus group discussions of women's group members (see § 4.2.4 on page 95) is reproduced as Appendix U. This also contains the thematic analysis for questions F23, F24 and F25 (see Appendix T for questionnaire), which is summarised in §7.4.4.7. All of this qualitative data is useful for determining what the women may be valuing when they say they are willing-to-pay for the groups. This is explored further in the discussion of this chapter (§7.5).

7.4.2 Household expenditure

Figure 7.3 details the distribution of monthly monetary (in MKW) household expenditure on food, agriculture, rent, transport, education, healthcare, social activities, other, and the equivalent of donations and barter exchanges, of respondents willing-to-pay for the women's groups with money, in each of the three study groups.[11] From Figure 7.3 it is apparent that the greatest monetary expenditure is generally on agriculture, followed by food (except for the control women), as might be expected in poor rural communities that are mainly engaged in subsistence farming. Women in control areas tend to also spend significant amounts of their household budget on 'other' things (in the questionnaire, see Appendix T, these were suggested as "(e.g. clothes, animals, consumer items)") and barter exchanges (*How much money were the goods given to your household / acquired through barter/exchange worth?*). Among women's group members and control group women there is also fairly significant expenditure on transport. Expenditure on the other categories: rent, education, healthcare, social activities; is generally negligible, as perhaps can be explained by the fact that most villagers are given houses to live in by the chief of their village for very low rents, or payment in kind, primary schools and healthcare are free, and social activities in rural areas rarely require spending money. Total household monetary expenditure of respondents was higher in women's group members than non-members in the same village; and high, but more skewed towards higher expenditure in control group areas (Table 7.4); however, these differences were not statistically significant. As with all of the household expenditure data in this section, the numbers of respondents in each group is very small (<17 for all sub-groups, see Table 7.4), meaning that we must be careful not to draw any

[11] Outliers have been excluded from these, and the following box plots

Figure 7.3: Household expenditure in Money, by category, by arm

conclusions (Kahneman, 2011b) regarding differences in household expenditure between groups based on this data. Instead, this data is merely useful as a guide to what household expenditure in rural Malawi might be from the perspective of women in these communities. The stated monetary household expenditure from this survey is, considering inflation, in line with that observed from the national Integrated Household Survey of 2004/5, which estimated daily expenditure for rural households to be 238MKW (National Statistical Office (NSO) [Malawi], 2005).

Figure 7.4 details the distribution of weekly expenditure of time women's group members and non-members (there was only one control group woman who chose to pay in time) spend on cooking, cleaning, looking after children, other housework (e.g. fetching water), farming, other work (e.g. paid employment), and social activities. It clearly shows that, apart from work and social activities, non-members appear to spend a lot more time on all activities; and women's group members spend very little time on all of these activities in a week. Looking at the data it appears that 15 respondents, including all 8 of the women's group members choosing to pay in time, were probably estimating time spent per day on each activity (typically 1-2hrs) rather than per week. I have therefore corrected the data by multiplying each of the responses of these 15 respondents by 7 so that they approximate weekly time spent on these activities. From this point forward I will only present and use the corrected time data (also corrected for WTP) in my analysis and discussion. The corrected weekly total time expenditure data is shown in Figure 7.5. This graph shows that time spent per week on the different activities may be similar between women's group members and non-members in the same village, although non-members appear to spend more time farming and cooking and less time looking after children and doing

Table 7.4: Total Household expenditure, by payment vehicle, by arm

payment vehicle	arm	n	min	p25	median	p75	max	mean[a]	se(mean)
Money (MKW/month)	wg	10	3080	8300	12825	15490	43700	15044	3662
	non	5	1620	4800	8340	14600	23800	10632	3935
	control	12	600	1675	11060	47575	81500	25198	8084
	total	27	600	4800	12500	23900	81500	18740	3978
Time (hr/week)	wg	8	7	8	9	10	56	14.6	5.9
	non	14	7	8	11	66	103	34.4	9.0
	control	1						112	
	total	23	7	8	10	56	112	30.9	7.1
Time (hr/week) corrected[b]	wg	8	49	56	59.5	66.5	70	60.4	2.6
	non	14	40	56	63	77	103	64.8	4.4
	control	1						112	
	total	23	40	56	63	70	112	65.3	3.5
Ufa (Kg/month)	wg	17	2	45	50	75	584	94.8	32.6
	non	14	4	40	52.5	70	120	57.8	8.7
	control	16	15	26	50	50.5	450	66.4	25.9
	total	47	2	40	50	70	584	74.1	14.8

[a]for all payment vehicles none of the observed differences between study arms are $p<0.05$ statistically significant
[b]"corrected" refers to the fact that 15 respondents appeared to give daily amounts of time (totalling to 12hrs or less for all categories) - the responses of these respondents have been multiplied by 7

other housework or other work. Using the corrected data, total expenditure of time on activities per week was similar in women's group members (median: 59.5hrs, mean: 60.4hrs, SE(mean): 2.6hrs) and non-members in the same village (median: 63hrs, mean: 64.8hrs, SE(mean): 4.4hrs; Table 7.4).

Moving on to household expenditure in terms of kilograms of maize flour (ufa) per month, Figure 7.6 shows that the vast majority of maize use, and broadly similar amounts in all three arms of the study, is on feeding the woman's household, with much smaller amounts spent on others, and negligible amounts sold or given to others (with the exception of some non-members). Median amounts of maize use per month are similar across all three groups, although a few high outliers among women's group members and controls push the mean figures higher for these two groups (Table 7.4).

7.4.3 A note on exchange rates

Using exchange rates between time, money and ufa we could look at total household expenditure regardless of payment vehicle of the whole samples of each of the study arms. However, exchanges between time and money and ufa and money can be considered incomparable for the following reasons. With time there is a total maximum of 7*24=168 hours in a week and 24*30=720 hours in a month, whereas there is less of a concrete maximum for monetary monthly expenditure. Reasonably, you could perhaps expect a maximum of 300 hours of work/activity from someone in a month (in our sample we observe a maximum of 112 hours in a week (Table 7.4), which corresponds to about 480 hours in a month). Given maximum monthly monetary expenditure is 81500MKW (Table 7.4), this equates to approximately 270MKW per hour, which is high

Figure 7.4: Household expenditure: Time in a week, by category, by arm

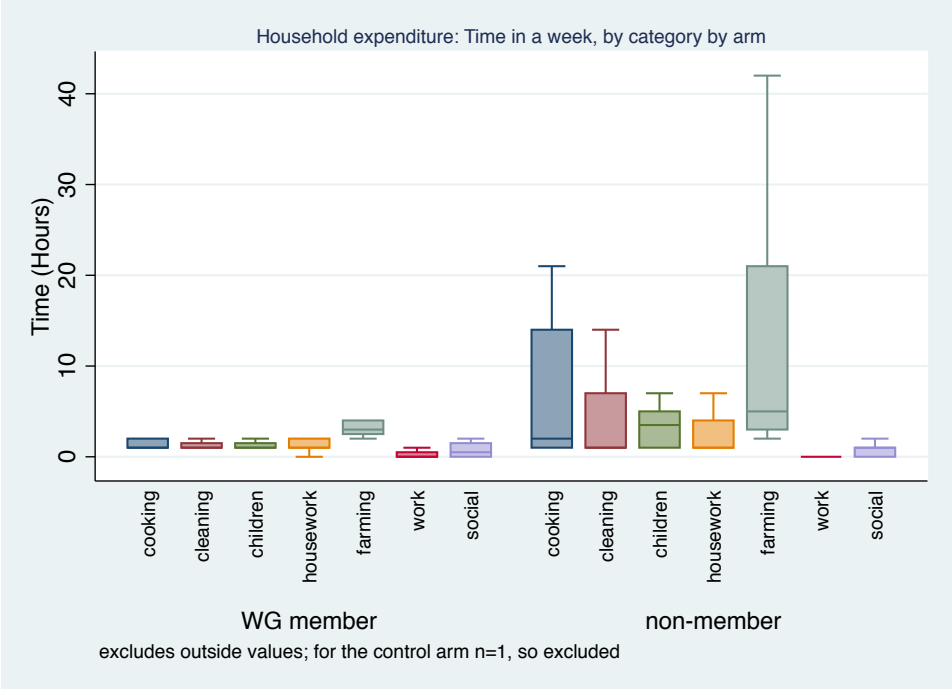
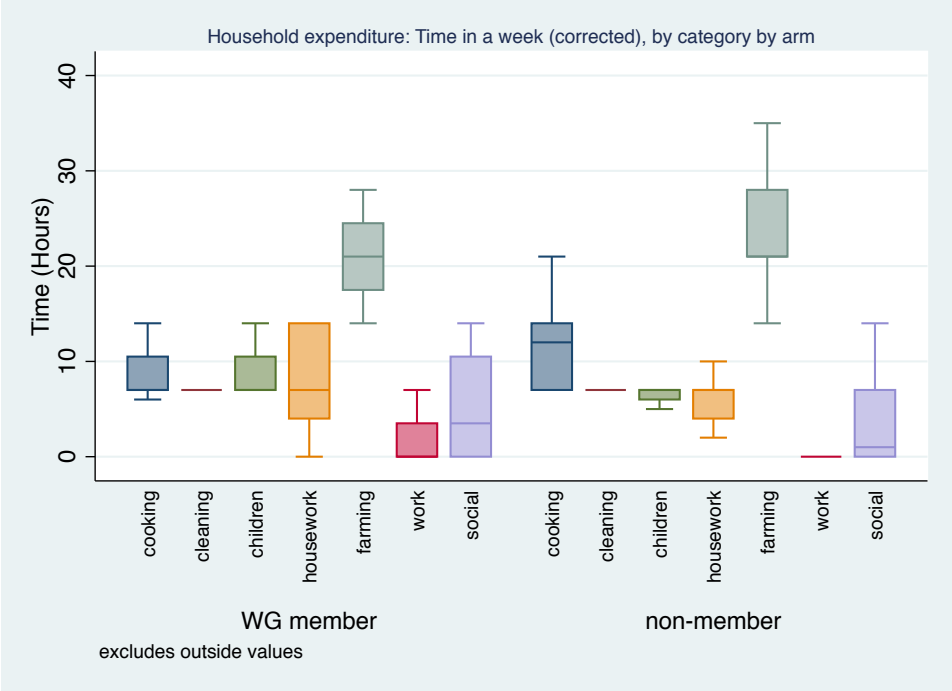
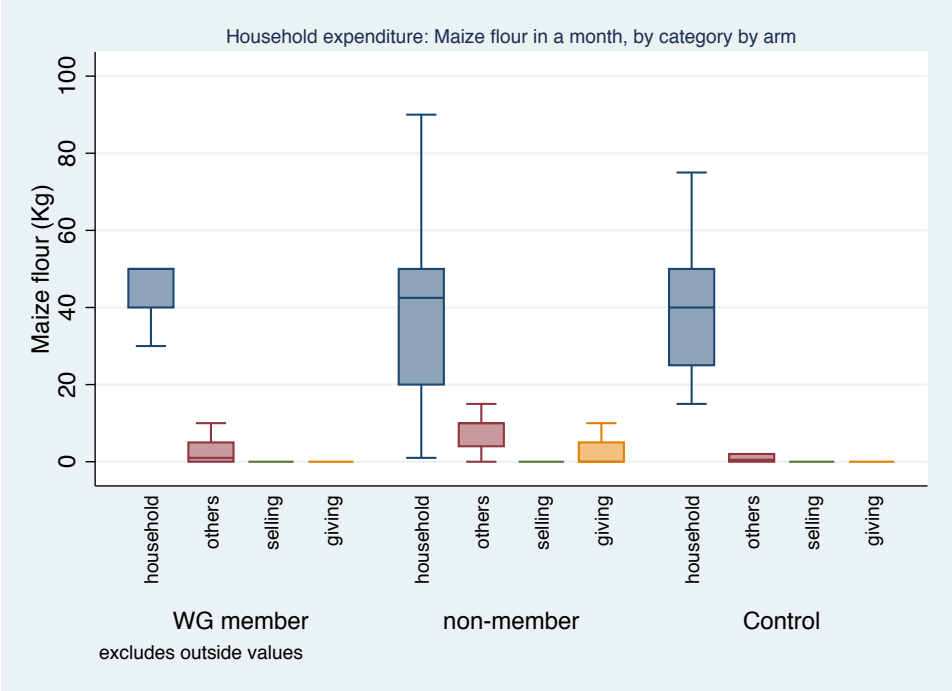


Figure 7.5: Household expenditure: Time in a week (corrected[a]), by category, by arm



[a] see footnote b to Table 7.4

Figure 7.6: Household expenditure: maize flour per month, by category, by arm



compared to the costs of labour in rural areas. Labour in rural areas typically costs around 200MKW per day (or the equivalent in goods), or less, which is roughly equivalent to average hourly wages of 25 MKW assuming the per capita GDP of Malawi of approximately $300 per year, the exchange rate of 140 MKW per $1, and working time of 8 hours a day and 200 days a year. The latter method of conversion of per capita GDP to average hourly wages, is often used for conversion of time to money in household expenditure studies (Russell, 2004). Clearly it is inappropriate here though as it would result in maximum time expenditures of far less than equivalent maximum monetary expenditures, and the WTP estimates given in time, once converted to money, being considerably less than the WTP estimates given in money. Conversion of ufa expenditure to monetary expenditure faces the same problem. The maximum amount of maize flour spent per month is unlikely to be based on the maximum amount of total monetary expenditure - indeed food only represents typically one sixth (median: 2000MKW; mean: 2438MKW) of total expenditure (median: 12500MKW; mean: 18740MKW; Table 7.4). Using this one-sixth amount instead as a basis for the exchange rate would be more reasonable, and given median ufa use is 50Kg per month (and mean is 74.1Kg; Table 7.4) an exchange rate of 40MKW/Kg ufa could be reasonable (and does indeed reflect the market price of ufa in rural Malawi). However, this would effectively peg the ufa expenditure to be approximately one-sixth of monetary expenditure, enforcing large differentials in 'total' expenditure between women choosing to pay by these two different vehicles, and making accurate comparison between these two groups of women impossible. We therefore have no fixed exchange rate method of converting expenditure in the three payment vehicles to a common metric, as all possible methods lead

to circular reasoning by forcing exchange rates to result in similar expenditure across the three groups, when it is the expenditure that we want to investigate, rather than construct.

An alternative method however is to transform the expenditure (and WTP) amounts of all three payment vehicles to standard scores and then back converting these standardised scores to money (or time or ufa). One method of doing this is a linear transformation to z-scores with mean 0 and standard deviation 1. Each value is transformed by subtracting the mean of its distribution and then dividing by the standard deviation of its distribution. This method of transformation to standard scores produced problematic results however, as given it assumes an interval scale, some of the observations for time and ufa resulted in negative values for WTP (and household expenditure) when back translated to money (by multiplying by the standard deviation of the monetary values and adding the mean of the monetary values) due to them being further below their mean values in terms of standard deviation than the minimum values of monetary WTP were away from the mean monetary WTP value. I therefore chose a congruence (similarity) transformation assuming a ratio scale to ensure all values were above zero (Borgatti, 2010). This transformation involved dividing each value by the square root of the sum of all the squared values in its category, and resulted in the values for money, time and ufa being ratios of each other, essentially assigning exchange rates by assuming a common underlying distribution for all three categories of payment vehicle.[12] The standardised scores were converted back to money by multiplying them each by the square root of the sum of squares of the monetary values.

Although conversion to standard scores is not commonly used in household expenditure or WTP studies (indeed I am not aware of any studies that have employed it), it has been commonly used in other research disciplines from Francis Galton's early work in the 1870s (Galton, 1874), onwards. It is useful as it only assumes similar shaped distributions of the different variables, and enables direct comparison assuming the same underlying distribution. The assumption of similar shaped distributions for conversion of the WTP values to a single metric holds very well (monetary WTP: skewness: 2.0, kurtosis: 6.9; time WTP: skewness: 2.0, kurtosis: 7.2; ufa WTP: skewness: 2.0, kurtosis: 7.6), however, it holds less well for the conversion of total expenditure to a single metric as total ufa expenditure has a more skewed distribution (skewness: 3.9, kurtosis: 18.2) than total monetary expenditure (skewness: 1.5, kurtosis: 4.6) or total time expenditure (skewness: 1.2, kurtosis: 4.4).

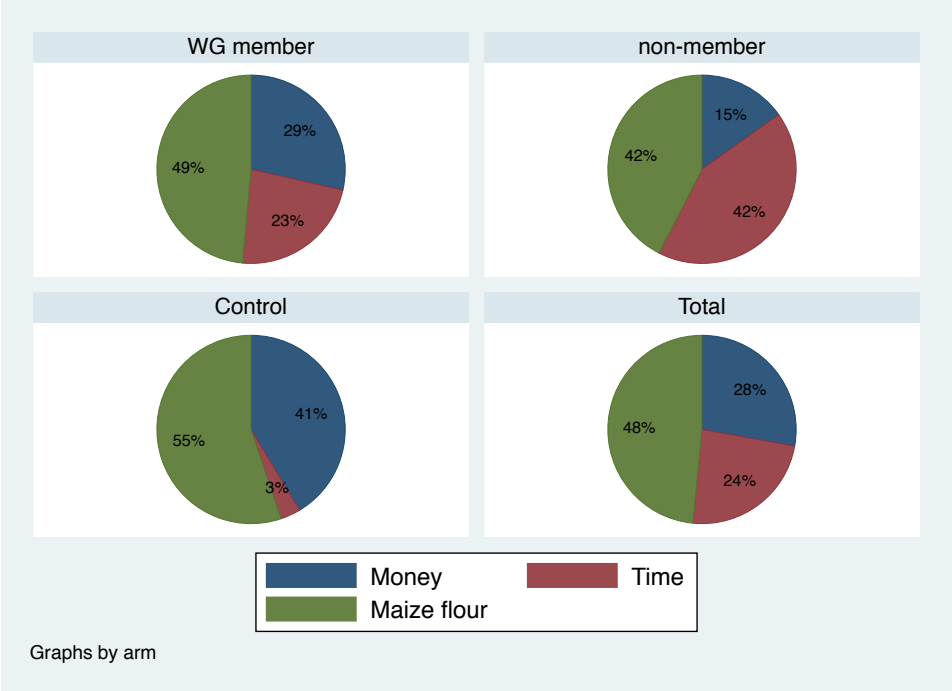
For the sake of greater understanding of how the different payment vehicles may influence willingness-to-pay, I also separate my analyses of WTP by payment vehicle, focusing on absolute amounts women are willing-to-pay and willingness-to-pay as a proportion of stated total expenditure in that 'currency', as detailed below.

7.4.4 Willingness-to-pay

Overall, 35 out of 36 women's group members and 33 out of 34 non-members in the same village (97% of each of these groups) were willing-to-pay for the continuation of the MaiKhanda women's

[12] the possibility of different mental accounts for payment by different payment vehicles, however, calls into question this assumption - see eighth paragraph of §7.5

Figure 7.7: Payment vehicle chosen, by study arm



groups. In contrast, 29 out of 36 (81%) control group women were willing-to-pay for the women's groups (p=0.011[13]). Below I present results of respondents preferences for payment vehicle, absolute and proportionate amounts respondents were willing-to-pay, associations with ability-to-pay, and univariate and multivariate regressions of willingness-to-pay with socio-demographic and contextual variables.

7.4.4.1 Payment vehicle

Women's group members preferred maize flour (ufa) as a payment vehicle over money or time, which were approximately equally preferred. Among non-members ufa and time were equally preferred and only 15% chose to pay in money. Among control women, the majority also preferred to pay in ufa and money was also a popular choice of payment vehicle with only one woman of the 29 who were willing-to-pay choosing to pay in time (Figure 7.7).

7.4.4.2 Absolute amounts

Willingness-to-pay in absolute amounts of money, time and ufa, and all transformed to money, are detailed in Table 7.5[14]. This information will be useful if contributions are actually required

[13] in an ordinary least squares (OLS) regression of the proportion of women willing-to-pay by study arm, the percentage of control group women who were willing-to-pay was p=0.011 significantly lower (-16.7%; 95%CI: -29.3%, -4.0%) than the reference group (women's group members). The same proportion of non-members were willing-to-pay (-0.2%; 95%CI: -13.0%, 12.7%; p=0.980).

[14] 'corrected' refers to the fact that 15 respondents appeared to give daily amounts of time for their total expenditure (see Table 7.4) - the WTP responses of these respondents have been multiplied by 7. However, it's possible that these respondents did not also give daily amounts of time for their WTP and that these 'corrected'

from members of the community to run the groups in future. Converting the three types of WTP values to a single metric of money (see §7.4.3), the mean WTP for the whole sample of respondents was 301MKW, with the mean amounts and distributions being similar for women's group members, non-members (slightly lower average WTP) and women in control areas (slightly higher average WTP, Table 7.5; Table 7.7 on page 210 shows that the differences between study arms are not statistically significant). For those willing-to-pay with money the mean stated payment was 381MKW per month. Non-members and women in control areas (were found to be willing-to-pay more money per month than women's group members (Table .7.5), although given the small numbers of respondents these differences were not statistically significant.[15] For those willing-to-pay in time, the mean stated payment was 3.9 hours per week; making the same changes to these numbers as for those for total expenditure (see Table 7.4), yields a mean of 10.7 hours per week. Using the uncorrected figures, the amount of time non-members were WTP per week was not found to be significantly less than the amount women's group members were willing-to-pay per week (Table 7.5), although the number of respondents in each group is very small. Using the 'corrected' figures non-members were found to being willing-to-pay statistically significantly less time per week towards the women's groups than women's group members (p=0.032). For those willing-to-pay in ufa, the mean stated payment was 7.5Kg per month and the stated amounts were very similar for all three study arms (Table 7.5), none of the small differences being statistically significant (regression results not shown).

7.4.4.3 Percentage of total expenditure

WTP as a proportion of total household expenditure is detailed in Table 7.6 for each of the three payment vehicles and the single-metric conversion, by study arm and in total. Overall, using the single-metric conversion (see §7.4.3) the respondents were willing-to-pay a mean of 3.4% of their total expenditure. Although non-members and control area women were willing-to-pay slightly more on average these differences were not statistically significant (see Table 7.8 on page 211). Those willing-to-pay money were willing-to-pay an average of 4.4% of their total household expenditure every month. Interestingly, both non-members and control group women were willing-to-pay a higher percentage of their total monetary expenditure than women's group members (Table 7.6; Table 7.8 on page 211). These relationships were still statistically significant after controlling for total household expenditure (see §7.4.4.5). Assuming the uncorrected figures (or 'correcting' both household expenditure and absolute WTP amounts), those willing-to-pay time were willing-to-pay an average of 17.8% of the total time they spent per week on other activities. Women's group members were willing to give more time than non-members (this is the opposite of the observation for percentage of monetary expenditure).[16] Those willing-to-pay ufa were willing-to-pay an average of 14.5% of their total household expenditure every month and the percentage did not vary much between the three study arms, as shown in Table 7.6 - none of these small differences were statistically significant.

numbers are therefore incorrect and the uncorrected numbers should be used instead.

[15] OLS regression of absolute monetary WTP (in MKW) by arm: non-members vs. members: +255 (95%CI: -258, +768; p=0.315); controls vs. members: +289 (95%CI: -112, 690; p=0.150); Table 7.7

[16] ordinary least squares (OLS) regression of percentage time WTP (hours per week): non-members vs. WG members: -16.0% (95%CI: -31.5%, -0.5%; p=0.043)

Table 7.5: Willingness-to-pay for MaiKhanda women's groups, by payment vehicle, by study arm: Absolute amounts

payment vehicle	arm	n	min	p25	median	p75	max	mean	se(mean)
Money (MKW/month)	wg	10	50	100	100	200	1000	205	90
	non	5	100	200	500	500	1000	460	157
	control	12	30	100	200	750	2000	494	168
	total	27	30	100	200	500	2000	381	88
Time (hr/week)	wg	8	1	1	2	3	45	7.2	5.4
	non	14	1	1	1.5	3	5	2.0	0.3
	control	1						4	
	total	23	1	1	2	3	45	3.9	1.9
Time (hr/week) 'corrected'	wg	8	7	7	14	21	45	17.0	4.7
	non	14	1	3	7	14	21	7.6	1.6
	control	1						4	
	total	23	1	4	7	14	45	10.7	2.1
Ufa (Kg/month)	wg	17	1	2	5	10	32	8.1	1.9
	non	14	1	2	5	10	35	8.3	2.4
	control	16	1	2	4	10	20	6.1	1.4
	total	47	1	2	5	10	35	7.5	1.1
Single-metric conversion	wg	35	43	85	150	427	1978	300	70
Money (MKW/month)	non	33	43	85	132	427	1495	257	55
	control	29	30	100	200	427	2000	353	78
	total	97	30	85	176	427	2000	301	39

Table 7.6: Willingness-to-pay for MaiKhanda women's groups, by payment vehicle, by study arm: Percentage of total household expenditure

payment vehicle	arm	n	min	p25	median	p75	max	mean	se(mean)
Money	wg	10	0.2%	0.6%	1.0%	1.7%	8.0%	1.8%	0.7%
	non	5	1.2%	2.1%	6.8%	10.4%	12.3%	6.6%	2.2%
	control	12	0.2%	1.4%	4.0%	9.8%	15.4%	5.6%	1.5%
	total	27	0.2%	0.8%	2.1%	8.0%	15.4%	4.4%	0.9%
Time	wg	8	10.0%	13.4%	21.1%	34.7%	80.4%	28.6%	8.3%
	non	14	1.3%	4.9%	10.6%	16.7%	42.9%	12.6%	3.1%
	control	1	3.6%					3.6%	
	total	23	1.3%	5.2%	12.5%	25.0%	80.4%	17.8%	3.8%
Ufa	wg	17	1.9%	5.5%	12.5%	20.0%	50.0%	15.1%	3.2%
	non	14	2.0%	4.8%	14.6%	21.4%	50.0%	16.0%	3.4%
	control	16	3.9%	5.3%	8.7%	16.7%	40.0%	12.6%	2.6%
	total	47	1.9%	4.8%	12.5%	20.0%	50.0%	14.5%	1.8%
Single-metric	wg	35	0.2%	1.0%	1.7%	4.4%	12.7%	3.0%	0.5%
Money	non	33	0.1%	1.0%	2.1%	4.6%	12.7%	3.3%	0.6%
	control	29	0.2%	1.2%	2.5%	5.1%	15.4%	4.1%	0.7%
	total	97	0.1%	1.0%	2.1%	5.0%	15.4%	3.4%	0.3%

7.4.4.4 The relationship between absolute WTP amounts and percentage WTP amounts

Regressing WTP in absolute amounts against WTP as a percentage of total expenditure characterises the relationship between the two, useful when comparing the two sets of results, especially in the context of their associations with other variables (§7.4.4.6). For the single-metric conversion, absolute WTP in money per month was found to be significantly associated with its conversion into WTP as a percentage of total monthly household expenditure (3.2% increase per 1000MKW absolute increase, 95%CI: 1.5%, 4.9%; p=0.000; OLS regression). By payment vehicle, WTP in money per month was found to not be significantly associated with its conversion to a percentage of total monthly household expenditure (1.0% increase per 1000MKW absolute increase, 95%CI: -3.1%, 5.1%; p=0.607; OLS regression). Both absolute WTP in time and ufa were, however, found to be associated with their corresponding conversions into percentage of total expenditure ('corrected'[17] time: 1.3% increase per 1hr absolute increase, 95%CI: 0.8%, 1.7%; p=0.000; ufa: 0.7% increase per 1Kg absolute increase, 95%CI: 0.3%, 1.2%; p=0.001; OLS regressions). The latter implies that the distributions of total expenditures of time and ufa (which the percentage WTP are dependent on) are less varied than the distribution of total monetary expenditure, which from the data presented in §7.4.2, does indeed seem to be the case.

7.4.4.5 Willingness-to-pay and Ability-to-pay

Absolute amounts respondents are willing-to-pay could be affected by their total expenditure (a proxy for their ability-to-pay). There is a significant association between increased standardised monetary WTP and increased household expenditure: with an average increase in WTP of 10.3 MKW per 1000 MKW increase in total standardised household expenditure (95%CI: 6.5 MKW, 14.2 MKW; p=0.000; OLS regression; Table 7.7 on page 210). By payment vehicle, both money and ufa WTP absolute amounts are significantly associated with total household expenditures (Table 7.7 on page 210). In contrast to money and ufa, given there are only so many hours in a week, higher expenditure of time on other activities could, after a point, be considered a proxy for a *lower* ability-to-pay additional time. Amounts of time (hours per week) respondents indicated they were WTP for the women's groups were not, however, found to be associated with total weekly time expenditure (Table 7.7 on page 210).[18]

The proportion of total expenditure respondents are willing-to-pay is a reflection of their ability-to-pay in the sense that the same absolute amount translates to higher or lower proportions of total expenditure given lower or higher absolute amounts of total expenditure, respectively. Total standardised monetary expenditure was found to be slightly negatively associated with the proportion of total standardised monetary expenditure women were willing-to-pay (-0.06% per increase of 1000 MKW total expenditure (95%CI: -0.10%, -0.03%; p=0.001; Table 7.8 on page 211). This suggests the women may have been valuing the women's groups in absolute

[17] see footnote 14 on page 204

[18] all comparisons between corrected (see footnote 14) and uncorrected time estimates and household expenditure estimates were found to not be significantly different, data not shown.

terms rather than relative to their own total expenditure; although, given the results presented in the previous paragraph, they were likely also mindful of what they could afford, perhaps limiting their payment to less than what they believed the true value of the groups to be as a result. Following this line of reasoning would mean the women with higher total expenditure were not willing-to-pay correspondingly *more* than what they believed the true value to be. By payment vehicle, this relationship was observed for monetary expenditure (-0.11%, 95%CI: -0.19%, -0.03%; p=0.010; Table 7.8 on page 211), but not for time expenditure or ufa expenditure (Table 7.8).

7.4.4.6 WTP and socio-demographic and contextual variables

It is useful to examine how WTP in both absolute amounts and as a proportion of total expenditure vary by socio-demographic and relevant contextual variables. In this section I examine these variations by presenting and discussing the results of regression analyses, introduced in §7.2.2, which also includes my original hypotheses as to how the variables might affect WTP. Univariate regressions are first presented for each of absolute and proportionate WTP by standardised single-metric monetary value and each of the three payment vehicles, followed by final multivariate regressions after stepwise elimination of p>0.05 variables.

Table 7.7 details the results of a series of OLS regressions of absolute WTP (separate for standardised monetary value and each payment vehicle, columns of table) against each of the socio-demographic and contextual variables (rows of table, each variable regressed in separate univariate regressions; the distributions of these dependent variables are presented in §7.4.1).[19] Few significant associations were observed. The differences between study arms and the significant associations between total expenditure and absolute WTP in money and ufa were already discussed in §7.4.4.2 and §7.4.4.5. In addition to the positive association with household expenditure, standardised WTP for the whole sample was found to be positively associated with higher numbers of antenatal care visits (increase in WTP of 45.9MKW per ANC visit, 95%CI: 2.7, 89.2; p=0.038), and, with increases in the estimate of how much the respondent thought the groups cost to run every month (for every 1,000MKW extra women believed the monthly cost of the women's groups to be, they were willing-to-pay 5.6MKW more per month (95%CI: 0.1, 11.1; p=0.046; Table 7.7). By payment vehicle, the latter association was also observed for those willing-to-pay in money (for every 1,000MKW extra women believed the monthly cost of the women's groups to be, they were willing-to-pay 17MKW more per month, 95%CI: 2.5, 31.5; p=0.026). Those willing-to-pay in money who had primary education were found to be willing-to-pay less money per month than those with no education (-502MKW per month, 95%CI: -962, -41; p=0.034). Hours per week WTP was only significantly different by study arm, as already noted in §7.4.4.2. For those willing-to-pay in ufa, those who could read and write were found to be willing-to-pay 5.0Kg per month more than those who were illiterate (95%CI: 0.5, 9.4; p=0.029) and those who were ill were willing-to-pay 6.9Kg per month more

[19] Please note the WTP values for the reference categories are the constants (intercepts) of the regression equations and represent WTP at this 'base' state, their statistical significance merely denotes the WTP of these reference categories is likely to be non-zero in the total population the study sample represents. I therefore focus on the statistical significance of the other categories.

than those who were not ill at the time of the survey (95%CI: 2.3, 11.5; p=0.004; Table 7.7). The former finding was hypothesised (Table 7.1 on page 188), but a lack of the same effect being observed for payment in money or time, and the fact that primary educated respondents were willing-to-pay *less* money, means the finding is not very robust. As previously noted, the small sample sizes of many categories of respondents hampers the possibility of finding evidence for significant associations.

Table 7.8 details the results of the same univariate regressions, but for WTP as a proportion of total expenditure. Again few significant associations were observed. Differences between study arms and the associations between total monetary expenditure and percentage of total expenditure women were willing-to-pay was discussed earlier in §7.4.4.3 and §7.4.4.2, respectively. By payment vehicle, the proportion of money women were WTP was significantly higher in women who could write only (though there was only 1 respondent in this category who indicated she would like to pay in money and that she could write only), and significantly lower in women who could read and write (-4.0%, 95%CI: -7.1%, -0.8%; p=0.015), relative to those who could not read or write. The latter result is contrary to that observed for WTP in absolute amounts of ufa (see Table 7.7). The few widowed women who were willing-to-pay with money were found to be on average willing-to-pay 11.3% more of their total monthly monetary expenditure than the married women willing-to-pay in money (95%CI: 2.6% more, 20.1% more, than the 4.0% paid by the married women; p=0.013; Table 7.8).

Table 7.9 details the results of the multivariate restricted models that had more than one independent variable left in them after the stepwise elimination procedure, based on recommendations from Hosmer and Lemeshow (2000), which is summarised in the first footnote to the table. As the table shows, from 8 separate model building procedures (one for the standardised value and each of the three payment vehicles, for each of absolute and percentage WTP) only 3 resulted in multivariate models. For WTP as absolute money per month, total expenditure and primary education remained both $p<0.05$ significantly associated with WTP (per 1000MKW increase in total expenditure, WTP increased by 10.4MKW (95%CI: 2.6, 18.2, p=0.011), taking account of differences in respondents education, of which those with primary education were willing-to-pay 430MKW less than those with no education (95%CI: -840, -19; p=0.041; Table 7.9). For WTP as absolute ufa per month total expenditure, education, literacy, how much a women's group costs per month (this wasn't significant in the univariate regression, see Table 7.7 on the following page), and number of antennal care visits, all remained $p<0.05$ significantly associated with WTP. Controlling for the effects of the other variables in the model, increases in total ufa expenditure were associated with increases in WTP, primary education was associated in increased WTP, but secondary education in decreased WTP, relative to no education; and, semi-literacy (respondents only able to read, or only able to write) was associated with decreased WTP, and higher estimates of the running costs of women's groups were associated with lower WTP[20], and higher numbers of antenatal care visits were associated with higher WTP in ufa. For WTP as percentage of total monetary expenditure, study arm, total expenditure, and literacy remained $p<0.05$ significantly associated with WTP. Controlling

[20]this is counter-intuitive; however, the association is only borderline p=0.050 significant and the univariate regression was p=0.198 significant in the opposite direction, see Table 7.7 on the next page

Table 7.7: Univariate regressions of absolute WTP by socio-demographic and contextual variables

Univariate Regressions (separate regr. for each variable; coefficients for reference categories are constant terms)	**WTP as absolute amount**															
	Standardised (ratio) for whole sample (Money, MKW per month) 95%CI				Money (MKW per month) 95%CI				Time corrected (hours per week) 95%CI				Ufa (Kg per month) 95%CI			
Independent variable[a]	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Study Arm: Reference=WG members (n-36)	300	0.000	171	429	205	0.166	-91	501	17.0	0.000	10.2	23.8	8.1	0.000	4.5	11.8
Non-members (n=34)	-43	0.648	-228	143	255	0.315	-258	768	***-9.4***	***0.032***	***-18.0***	***-0.9***	0.2	0.951	-5.3	5.6
Control (n=36)	54	0.580	-138	245	289	0.150	-112	690	-13.0	0.200	-33.4	7.4	-2.1	0.434	-7.3	3.2
Total expenditure (per 1000MKW; 1hr; 10Kg, respectively)	**10.3**	**0.000**	**6.5**	**14.2**	**11.8**	**0.004**	**4.1**	**19.5**	-12.3	0.341	-38.4	13.9	**0.4**	**0.000**	**0.2**	**0.6**
Education: Reference=None (n=22)	330	0.000	153	507	717	0.000	352	1081	5.8	0.274	-4.9	16.4	4.6	0.068	-0.4	9.5
Primary (n=34)	-43	0.706	-269	183	***-502***	***0.034***	***-962***	***-41***	4.9	0.488	-9.5	19.2	4.8	0.128	-1.4	11.0
Secondary (n=32)	-55	0.629	-279	170	-305	0.192	-776	164	2.9	0.682	-11.5	17.2	1.7	0.579	-4.4	7.7
Tertiary (n=17)	12	0.929	-245	269	-652	0.077	-1380	77	8.4	0.189	-4.5	21.2	6.1	0.119	-1.6	13.9
Literacy: Reference=Can't read or write (n=40)	296	0.000	167	426	529	0.001	254	804	4.0	0.372	-5.1	13.1	4.8	0.007	1.4	8.2
read only (n=8)	-144	0.400	-482	194	-395	0.196	-1011	220	10.0	0.362	-12.4	32.4	0.2	0.967	-10.5	11.0
write only (n=2)	-154	0.585	-710	403	-329	0.500	-1322	663					-2.8	0.707	-17.6	12.0
read and write (n=55)	30	0.717	-136	197	-226	0.251	-624	172	8.5	0.105	-1.9	18.9	***5.0***	***0.029***	***0.5***	***9.4***
Marital Status: Reference=Married (n=90)	307	0.000	223	391	376	0.001	181	571	11.5	0.000	6.7	16.5	7.5	0.000	5.1	9.9
Single (n=0)																
Living as Married (n=1)	-257	0.510	-1027	514	-326	0.496	-1302	649								
Separated (n=1)	-221	0.570	-991	549									-5.5	0.474	-20.8	9.8
Divorced (n=9)	102	0.475	181	386	623	0.199	-352	1599	-5.6	0.475	-21.5	10.4	1.9	0.597	-5.3	9.1
Widowed (n=5)	-213	0.283	-605	179	-176	0.712	-1152	799	-4.6	0.556	-20.5	11.4	-5.5	0.474	-20.8	9.8
Ill: Reference category=not ill (n=81)	283	0.000	194	371	420	0.000	214	627	10.8	0.000	5.8	15.9	5.7	0.000	3.4	8.0
Ill (n=25)	78	0.397	-104	259	-179	0.409	-617	260	-0.6	0.904	-11.4	10.1	**6.9**	**0.004**	**2.3**	**11.5**
Age (years) (Age^2 also not significant)	-1.4	0.719	-8.9	6.1	-4.0	0.652	-22.0	14.0	-0.19	0.358	-0.61	0.23	0.11	0.297	-0.10	0.32
B4. Number of Women's Group meetings attended (per meeting)	-6.6	0.313	-19.4	6.3	-19.8	0.170	-48.5	9.0	0.22	0.612	-0.67	1.12	0.01	0.972	-0.34	0.35
B8. How much does a Women's Group costs to run in a month? (per 1,000 MKW)	***5.6***	***0.046***	***0.1***	***11.1***	***17.0***	***0.026***	***2.5***	***31.5***	-0.15	0.241	-0.42	0.11	0.10	0.198	-0.06	0.26
C10. Risk to MNH in their community: Reference=Low (n=58)	290	0.000	188	392	225	0.107	-52	502	12.4	0.000	7.4	17.3	8.6	0.000	5.9	11.4
High (n=48)	27	0.737	-130	183	262	0.147	-98	622	-6.4	0.188	-16.1	3.4	-2.9	0.188	-7.3	1.5
C11. Number of ANC visits during last pregnancy (per visit)	***45.9***	***0.038***	***2.7***	***89.2***	81.4	0.224	-53.4	216.2	-0.44	0.701	-2.79	1.91	***1.33***	***0.017***	***0.25***	***2.41***
C12. Delivery place of last baby: Reference=Health Facility (n=91)	322	0.000	239	405	414	0.000	218	610	10.7	0.000	5.6	15.9	7.7	0.000	5.3	10.0
Home (village) (n=6)	-193	0.398	-643	258	-264	0.449	-970	443	3.3	0.770	-19.8	26.3				
TBA (n=6)	-164	0.319	-488	160	-364	0.451	-1344	616	-0.2	0.977	-16.9	16.4	-1.7	0.714	-10.8	7.4
Road (n=1)	-279	0.474	-1051	492									-6.7	0.388	-22.1	8.7
Never Delivered (n=2)	-87	0.755	-635	462					-3.7	0.738	-26.8	19.3	2.3	0.761	-13.1	17.7

[a]numbers (n=) refer to total numbers for all payment vehicles combined (standardised for whole sample); the numbers in the regressions for each payment vehicle will be lower.

0.050>p>0.010 **p<0.010** **p<0.001**

Table 7.8: Univariate regressions of WTP as percentage of total expenditure by socio-demographic and contextual variables

Univariate Regressions (separate regr. for each variable; coefficients for reference categories are constant terms)	**WTP as percentage of total expenditure**															
	Standardised (ratio) for whole sample (Money, % of MKW per month) 95%CI				Money (% of MKW per month) 95%CI				Time corrected (% of hours per week) 95%CI				Ufa (% of Kg per month) 95%CI			
Independent variable	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Study Arm: Reference=WG members (n-36)	3.0	0.000	2.9	4.2	1.8	0.184	-0.9	4.6	12.7	0.039	0.7	24.7	15.2	0.000	9.2	21.1
Non-members (n=34)	0.2	0.805	-1.5	1.9	4.7	0.053	-0.1	9.5	-9.6	0.199	-24.6	5.5	0.8	0.849	-8.0	9.7
Control (n=36)	1.1	0.226	-0.7	2.8	3.8	0.050	0.0	7.5	-9.1	0.603	-45.1	26.9	-2.5	0.556	-11.1	6.1
Total expenditure (per 1000MKW; 1hr; 10Kg,	**-0.06**	**0.001**	**-0.10**	**-0.03**	***-0.11***	***0.010***	***-0.19***	***-0.03***	-0.1	0.586	-0.5	0.3	-0.3	0.062	-0.7	0.0
Education: Reference=None (n=22)	3.1	0.000	1.6	4.7	5.3	0.011	1.3	9.3	1.9	0.818	-15.4	19.3	10.7	0.010	2.7	18.7
Primary (n=34)	1.3	0.195	-0.7	3.3	-0.2	0.936	-5.2	4.8	1.7	0.880	-21.6	25.0	8.3	0.108	-1.8	18.4
Secondary (n=32)	-0.1	0.928	-2.1	1.9	-2.3	0.355	-7.5	2.8	0.4	0.975	-23.0	23.6	3.3	0.508	-6.6	13.2
Tertiary (n=17)	-0.5	0.663	-2.8	1.8	-1.2	0.757	-9.1	6.8	10.4	0.309	-10.5	31.3	-0.2	0.967	-12.9	12.4
Literacy: Reference=Can't read or write (n=40)	4.2	0.000	3.0	5.3	6.2	0.000	4.0	8.4	2.4	0.745	-13.2	18.1	14.8	0.000	0.9	20.5
read only (n=8)	-2.6	0.078	-5.6	0.3	-4.8	0.051	-9.6	0.0	1.1	0.953	-37.3	39.5	-9.8	0.281	-28.1	8.4
write only (n=2)	4.0	0.099	-0.8	8.9	***9.2***	***0.023***	***1.4***	***17.0***					-10.8	0.393	-35.9	14.4
read and write (n=55)	-1.2	0.114	-2.6	0.3	***-4.0***	***0.015***	***-7.1***	***-0.8***	5.3	0.539	-12.5	23.2	0.7	0.845	-6.8	8.2
Marital Status: Reference=Married (n=90)	3.4	0.000	2.7	4.2	4.0	0.000	2.3	5.8	7.3	0.073	-0.8	15.3	14.7	0.000	10.8	18.5
Single (n=0)																
Living as Married (n=1)	-3.2	0.363	-10.2	3.8	-3.8	0.376	-12.6	4.9								
Separated (n=1)	-2.4	0.497	-9.3	4.6									-10.7	0.390	35.4	14.1
Divorced (n=9)	0.4	0.748	-2.1	3.0	1.8	0.668	-6.9	10.6	-3.8	0.761	-30.0	22.3	3.2	0.578	-8.3	14.8
Widowed (n=5)	10.9	0.543	-2.4	4.6	***11.3***	***0.013***	***2.6***	***20.1***	-5.8	0.648	-32.0	20.3	-12.7	0.308	-37.4	12.1
Ill: Reference category=not ill (n=81)	3.4	0.000	2.6	4.2	4.7	0.000	2.6	6.8	7.3	0.073	-0.7	15.4	13.3	0.000	9.3	17.5
Ill (n=25)	0.2	0.768	-1.4	1.9	-1.5	0.492	-5.9	2.9	-4.0	0.640	-21.3	13.4	4.4	0.276	-3.7	12.5
Age (years) (Age^2 also not significant)	0.02	0.640	-0.08	0.05	0.02	0.742	-0.15	0.21	-0.35	0.296	-1.01	0.33	-0.08	0.651	-0.42	0.27
B4. Number of Women's Group meetings attended (per meeting)	-0.09	0.129	-0.20	0.03	***-0.31***	***0.027***	***-0.58***	***-0.04***	-0.17	0.811	-1.63	1.29	-0.01	0.980	-0.57	0.56
B8. How much does a Women's Group costs to run in a month? (per 1,000 MKW)	0.02	0.197	0.01	0.06	-0.02	0.642	-0.13	0.08	-0.08	0.739	-0.57	0.41	0.20	0.050	0.00	0.41
C10. Risk to MNH in their community: Reference=Low (n=58)	3.1	0.000	2.2	4.0	2.9	0.040	0.1	5.7	7.8	0.065	-0.5	16.0	15.1	0.000	10.5	19.7
High (n=48)	0.7	0.317	-0.7	2.1	2.5	0.171	-11.4	6.1	-4.9	0.534	-21.1	11.3	-1.5	0.689	-8.7	5.8
C11. Number of ANC visits during last pregnancy (per visit)	0.19	0.315	-0.19	0.57	0.04	0.945	-1.24	1.33	-0.15	0.936	-3.96	3.66	1.36	0.145	-0.49	3.21
C12. Delivery place of last baby: Reference=Health Facility (n=91)	3.4	0.000	2.6	4.1	4.4	0.000	2.5	6.4	7.3	0.083	-1.0	15.6	13.7	0.000	9.9	17.4
Home (village) (n=6)	1.3	0.539	-2.8	5.3	1.2	0.716	-5.8	8.3	-3.7	0.837	-40.9	33.5				
TBA (n=6)	0.0	0.984	-3.0	2.9	-4.2	0.381	-14.0	5.6	-4.7	0.720	-31.6	22.2	7.6	0.304	-7.1	22.2
Road (n=1)	3.0	0.394	-4.0	10.0									11.3	0.361	-13.4	36.1
Never Delivered (n=2)	-0.1	0.966	-5.1	4.9					-5.2	0.772	-42.4	32.0	6.3	0.608	-18.4	31.1

[a]numbers (n=) refer to total numbers for all payment vehicles combined (standardised for whole sample); the numbers in the regressions for each payment vehicle will be lower.

0.050>p>0.010 **p<0.010** **p<0.001**

for the effects of the other variables in the model, control group women were willing-to-pay a higher percentage of total monetary expenditure, increases in total expenditure were associated with decreases in WTP as a percentage of total expenditure (this is the same result noted in the univariate regressions), and those who could only read, or who could read or write, were willing-to-pay less than those who could not read or write (Table 7.9).

7.4.4.7 Reasons for payment or non-payment

All of those who were willing-to-pay for the women's groups gave a reason for doing so (an answer to question F23: *You decided to pay something, why did you decide this?*; see Appendix T for questionnaire, which also contains probes for this question). There was some overlap with what people thought of the groups (answers to question B5 and B6, see §7.4.1), especially with regard to the groups increasing knowledge and awareness and reducing deaths (see Appendix U for the full thematic analysis of question F23; and F24 and F25). However, the majority of reasons for being willing-to-pay were different to these opinions; or perhaps additional reasons, but respondents usually only provided one reason in answer to question F23. One of the main themes coming out of the analysis of the responses to question F23 was that people thought the groups were good because they help many people in the community including mothers, babies, children, poor people and the whole village community, including their relatives, their own children, and themselves. Respondents indicated that they did not want the groups to end because of the help they provided people, and that they therefore wanted to pay in order to help sustain the groups. Such positive responses were not limited to women's group members who had experienced the groups first-hand, but were also expressed by non-members, and even is some cases, women from control areas. One non-member qualified her willingness-to-pay with a desire to join the group[21]; and some of the women in the control areas indicated that they wanted to pay for the groups because they wanted groups to be set up in their areas. In order to gain an appreciation of the women's sentiments in their own words, a representative collection of responses to question F23, on this theme of helping sustain the groups because they help people, is as follows:

"I see that the groups are very helpful" [WG member, id=90]

"The group really helps a lot of people in this area and it needs to be sustained" [non-member, id=340]

"Since its helping women I have opted to help with the little I have so that it should not end" [WG member, id=25]

"For the groups to continue helping women on maternal health" [non-member, id=350]

"So that women should be helped" [control, id=540]

"I also have children who may need this help." [non-member, id=340]

[21] from the limited information collected in this survey it was unclear why she had not already joined the group in her area

Table 7.9: Multivariate restricted regression models of absolute WTP and WTP as percentage of total expenditure

Multivariate Restricted models[a]	**WTP as absolute amount**								**WTP as percentage of total expenditure**			
	Money (MKW per month)				Ufa (Kg per month)				Money (% of MKW per month)			
			95%CI				95%CI				95%CI	
Independent variables[b]	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Study Arm: Reference=WG members (n-36)												
Non-members (n=34)									2.3	0.153	-0.9	5.7
Control (n=36)									**3.6**	**0.009**	**1.0**	**6.2**
Total expenditure (per 1000MKW; 1hr; 1Kg, respectively)	***10.4***	***0.011***	***2.6***	***18.2***	**0.44**	**0.001**	**0.25**	**0.64**	**-0.11**	**0.001**	**-0.17**	**-0.05**
Education: Reference=None (n=22)												
Primary (n=34)	***-430***	***0.041***	***-840***	***-19***	***17.4***	***0.012***	***4.9***	***29.9***				
Secondary (n=32)	-307	0.139	-722	108	***-9.8***	***0.043***	***-19.2***	***-0.4***				
Tertiary (n=17)	-433	0.189	-1097	230	-11.2	0.080	-24.1	1.7				
Literacy: Reference=Can't read or write (n=40)												
read only (n=8)					***-10.6***	***0.035***	***-20.2***	***-0.9***	***-4.5***	***0.023***	***-8.5***	***-0.7***
write only (n=2)					**-22.7**	**0.004**	**-36.1**	**-9.4**	5.9	0.062	-0.3	12.1
read and write (n=55)					8.8	0.097	-2.0	19.5	***-3.1***	***0.016***	***-5.6***	***-0.6***
B8. How much does a Women's Group costs to run in a month? (per 1,000 MKW)					***-0.19***	***0.050***	***-0.38***	***0.00***				
C11. Number of ANC visits during last pregnancy (per visit)					***1.42***	***0.019***	***0.30***	***2.55***				
constant	479	0.013	112	847	-1.3	0.633	-7.2	4.7	6.0	0.000	3.4	8.6

[a]all variables that were p<0.250 significant in univariate regressions were entered, then variables were sequentially removed in order of highest p-values, until the remaining model only contained variables p<0.05 significant

[b]numbers (n=) refer to total numbers for all payment vehicles combined; the numbers in the regressions for each payment vehicle will be lower.

0.050>p>0.010 **p<0.010** **p<0.001**

"I feel the groups sustainability rely in the hands of those who have experienced the goodness such groups have brought to the community" [WG member, id=20]

"It will benefit people of this village of which many are my relatives" [WG member, id=115]

"This is to ensure sustainability of the group. This contribution will help those in needy mainly those who are pregnant" [non-member, id=315]

"I just love giving towards activities that benefit my community" [non-member, id=225]

"I like what the groups are doing and i would love to see them go on" [WG member, id=105]

"I am happy with what the groups are doing and I can't be happy to see the group dying" [WG member, id=165]

"Just to sustain the group since I have realised that they are doing good for us." [non-member, id=270]

"Since I want to join it must also help that it should not close down" [non-member, id=205]

"This is to assist in the formation and sustaining of the group" [control, id=440]

"This just to agree that we want the group. This group may teach us a lot about child bearing and family planning methods" [control, id=535]

The other main theme for reasons for payment in addition to bringing knowledge, reducing deaths and helping people, was a desire to pay for specific things that the women perceived the groups to require, such as money for food items, for other materials required for the meetings, for funds for women to use to get medical attention, and for consoling families of people who die. In cases where ufa was chosen as the payment vehicle, a number of respondents stated that the ufa would be for the groups to use for feeding people, especially the needy, and also for their events. The following representative collection of quotes (see Appendix U for all quotes under this theme), illustrates these points in the women's own words:

"The money can also be used to access medical attention. The money can also be used to console the deceased families" [WG member, id=170]

"This money can also be used to procure some materials to be used" [non-member, id=285]

"This may enable the group to proceed. My contribution can be used to buy food items and other things" [control, id=450]

"This flour can be used to help the needy in the group or used during some events." [non-member, id=265]

"To help the group so that it sustain. This can be used to cook for the visitors even during gatherings" [non-member, id=290]

"This flour will be used in times of gatherings as well as helping the needy" [control, id=420]

"Am just interested with their work. My contributions will be used to feed people" [control, id=455]

In answer to question F24: *Did you have any problems answering the question on how much you would give?* only around one in eight respondents indicated that they did. None of these responses were about the methodology of eliciting WTP responses (the original motivation for including this question). Instead they were usually concerned with wanting to be flexible in how much they would give each month, including on what they would give (money, time or ufa), e.g.

"I would have loved if I was given the option of giving what is available that month" [WG member, id=100]

"*Because I would have loved if I could be given a chance to give what ever I have that month. For example, money this month and flour the other month*" [control, id=400]

with three saying that they weren't sure they could manage each month, e.g.

"I rarely have anything but I just thought that I can manage to give that much but not on monthly basis" [WG member, id=110]

This is a concern as it may mean that in some cases WTP was overstated.
One respondent wanted to be told a fixed amount to give:

"You could have a fixed amount of how much one should give" [WG member, id=120]

Others had problems with measurement, or with the reference case of how much their household expenditure was as they were not sure of what this was, e.g.:

"Time estimation was real a problem" [non-member, id=300]

"I don't do any home transactions, even my husband, he ill treats me a lot. Most of the things are bought by my parents so much that I don't know how much they spend." [non-member, id=295]

All nine respondents who were not willing-to-pay gave reasons for not paying (answered question F25: *You have decided not to pay anything, why did you decide this?*). Reasons included that the women had nothing to give (including time), five responses including:

"I don't have enough to give and since I took over the caring of these twins I am mostly busy" [WG member, id=95]

"*I have a lot of children and I am a single parent, and I don't know anything about the groups*" [control, id=515]

and one response where the woman was worried about not being able to pay when others were:

"I do not have anything and it would be difficult to join a group where others are paying something and you are just attending" [control, id=530]

This response highlights potential ethical problems with using the willingness-to-pay of potential beneficiaries as a proxy for the value of an intervention, which I return to in §7.5.

The only non-member who was not willing-to-pay said the group was *"no use"* to her. A control area respondent said she *"can not join the group"*. Both of these women did not give reasons for these answers. Finally, three control area respondents said they didn't want to pay as they didn't know enough about the groups, e.g.:

"I don't know much about the groups so I might decide if the groups come into our area" [control, id=465]

Although only a small minority, these responses are important to bear in mind as they indicate that the scenario outlining the groups that was read to the respondents (see section D of the questionnaire, Appendix T) may not have been adequate enough to accurately elicit WTP in those that were not familiar with the groups. Given the non-members are in the same village as the groups it is only really the control area women who are not familiar with the groups, therefore their estimates of WTP in particular may be less reliable than those of the members or non-members.

7.5 Discussion

All but one women's group member and all but one non-member stated that they were willing-to-pay for the groups, and 29 out of 36 women in control areas did too. Judging by the split of responses by payment in money, time and ufa, respondents liked the idea of alternative payment vehicles. Converting all responses to the monetary scale of Malawi Kwacha (MKW; \$1=140MKW), mean WTP was 301MKW per month (95%CI: 225, 377; median: 176, interquartile range: 85, 427) and was not significantly different between women's group members, non-members and controls. Given the random sampling procedure (§ 4.1.2.2 on page 79), this amount should be generalisable to rural women in Lilongwe, Kasungu and Salima districts of Malawi, and given broad similarities between the rural populations of all districts of Malawi (National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011), perhaps further generalisable. Payment was framed in the context of the woman's total household expenditure, so in cases where there could be more than one potential women's group member per household the payment is likely to be per household rather than per member. Even despite this, given total actual costs of the women's group intervention of approximately 200MKW per woman per month (see footnote 7 on page 192), the WTP estimate could yield a locally-funded sustainable woman's group intervention.

The household expenditure data is also interesting in its own right as it gives an insight into the extent to which agriculture and food are prioritised within households as well as quantifying the income constraints households in rural Malawi face.

Despite wide-spread expectation of 'hand-outs' from governments and NGOs in Malawi[22], no protest responses were observed in this study. Given the realistic scenario of decreased funding for MaiKhanda, this suggests that the groups (or the concept of the groups for those willing-to-pay despite being unfamiliar with them) are genuinely attractive to the respondents.

Whittington (1998), an early practitioner of contingent valuation studies in low-income countries, highlighted the need to ensure that WTP estimates were consistent with *ability* to pay. This study sought to estimate what respondents would actually pay were they asked for a monthly contribution for the women's groups in future, and given the realistic nature of the scenario (reduction of external funding) I hope this was achieved and that the estimate of willingness-to-pay was in line with ability-to-pay. Assuming from our observations that this was the case (§7.4.4.5), however, does not eliminate differences between estimates of value of the intervention derived from the local population and from external funders of the intervention. Indeed, given the often severe income constraints of the local population it is more likely to increase such differences. If we assume that the total benefits of the intervention, whatever they may be, are worth the WTP amount of the local population, then, as also suggested by Swallow and Woudyalew (1994), they will likely be grossly under-valued in comparison to how much external donors are willing-to-pay to secure the same benefits for the local population. This obviously has significant ethical implications: if cost-benefit analysis is to be informed by local people's WTP, then the grossly inequitable distribution of wealth would dictate a grossly inequitable distribution of interventions and outcomes. Such a situation clearly calls for external funding from those fortunate to be richer. However such intervention then calls forth issues of sustainability, although here there are perhaps distinctions between external intervention from local or national NGOs or governments, and that from foreign NGOs or governments. Again, however, inequitable global wealth distribution means the WTP of the former (properly constrained by ability-to-pay) will be lower than that of the latter. But dependence on the latter (foreign support) brings forth issues of sustainability, dependence and unwanted influence. The appropriate perspective for WTP estimates is clearly a complex issue. I return to it in §8.2 in the context of frameworks of economic evaluation of interventions. This contingent valuation study has achieved its objective of estimating local women's WTP for the women's group intervention, which, despite possible ethical shortcomings, can serve a practical purpose of enabling a fully sustainable, locally funded intervention. Indeed, as noted above, a fully locally-funded intervention may be possible.

The information on the reasons women were willing-to-pay for the groups (§7.4.4.7) is useful as it allows us some understanding as to what the women are valuing. Many of the responses are altruistic, and the responses of the non-members and controls cover both existence value

[22] anecdotal evidence suggest this stems from the culture of politicians giving money and gifts at election times as well as many foreign funded NGOs giving unsolicited goods away. Notably, MaiKhanda does not give goods away, but rather seeks to promote local ownership by facilitating the groups to lobby for or partner with other organisations to gain goods and services that they genuinely desire.

(liking to know it is there even if they won't use it) and option value (liking to have the option to get involved in WG in the future even though they don't plan to now). In terms of specifics, the responses also cover a number of perceived attributes of the group, in particular, that it increases knowledge and awareness, especially of mother and child health issues, and that it reduces mortality. The answers to questions B5 and B6 on the benefits of the groups (see §7.4.1) also highlight material benefits such as the groups providing bicycle ambulance transport or farming outputs. Overall, the thematic analysis of questions B5, B6 and F23 (see Appendix U) tell us that women value a variety of attributes of the group that impact on a variety of areas of quality of life as well as mortality (as they perceive it). This is consistent with the observations of the associations of women's groups with different areas of quality of life (§4), and is perhaps not surprising given the nature of the women's groups as a 'social or system intervention' (Osrin and Prost, 2010). Separating out WTP into different aspects of women's groups, in particular into that for health benefits and non-health benefits is difficult, however, as we can not assume that those who only gave a reason indicating one or other benefit truly only value that one benefit. This possibility also precludes exploratory analyses on how factors such as age affect reasoning behind WTP values in terms of non-use or existence value (altruism) or valuation due to perceived personal gain. In order to sub-divide WTP into different components, e.g. health and non-health, it would be necessary to sub-divide the WTP scenario. However, there are a number of risks associated with this, not least double counting (the embedding effect), additional cognitive burden for respondents and the need for supplementary qualitative data to ensure respondents understanding of the valuation of the different outcomes of the intervention (Olsen and Smith, 2001; Borghi and Jan, 2008).

The main limitation of this study was its relatively small sample size. This made it difficult to determine associations between socio-demographic and contextual variables and WTP, as the largely inconclusive univariate and multivariate regression results testify. Repeating these analyses on a larger sample could yield useful insights that could be considered in future targeting of the women's group intervention to women with specific characteristics. The fact that, due to their location, the control area women were less familiar with the women's groups than the members and non-members in the same village is also a limitation of the study, albeit an unavoidable one hopefully mitigated by the descriptions of the groups in the scenario read out to the respondents.

Another limitation, albeit one that is shared with all survey research, is that of the influence of framing effects (§5.5.2). In this study payment was framed in the context of the woman's total household expenditure in order to ensure compatibility with ability-to-pay. Alternative reference points include disposable income or some fraction of disposable income (Carson and Hanemann, 2005); although in most households in rural Malawi, where basic needs are often not met (National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011), there is no such thing as disposable income. Assuming total expenditure is the correct reference point, it remains unclear however, what the effect of such a reference point was in terms of 'mental accounts' for payment. 'Mental accounts' are theorised and observed to be commonly used to bound payments for certain categories of things (Thaler, 1985), such as 'health and development

interventions' that the women's groups may (or may not) fall into in the minds of the women completing the survey. Following from this it is also unclear whether, given the choice, not offered in this study, women would have diverted some or all of their expenditure for this category (or from their total expenditure) to a competing intervention. Despite recommendations by others such as Olsen and Smith (2001) to do so, this study did not include alternative interventions, however, as determining allocative efficiency of investment in interventions from WTP estimates of local beneficiaries becomes very complicated as it not only requires detailed information of all the effects of each intervention, but also requires effectively communicating such effects to the respondents. I discuss this further in §8.5.

The assumption that the three payment vehicles have distributions with the same absolute minimum and maximum values, inherent in the conversion of the values of each into a single metric (§7.4.3), is perhaps also a limitation. People may have different 'mental accounts' for payment in money, time and ufa, especially as available total time and ufa could be more restricted than total money in households (or money could be more restricted than time). Given that respondents were not asked about their exchange rates for the three payment vehicles, nor indeed asked directly about the possibility of separate mental accounts for them, the bias introduced by the single metric conversion, and its consequent effect on the results and conclusions, will remain unknown.

It is now well known that due to framing effects (Tversky and Kahneman, 1986) different elicitation formats should elicit different WTP estimates (Carson and Groves, 2007; Whittington, 1998, 2002); and this was indeed found to be the case in the pilot study (§7.3). However, assuming the final scenario was realistic to respondents, the elicitation question adequately framed[23], and that therefore WTP responses were genuine and would be close to those of a follow-up revealed preference study were funding for the women's groups actually sought from them, we can disregard this potential limitation. Indeed given that all economic behaviour must be seen as being inseparable from its context (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986; Thaler, 1985; Kahneman, 2011n), we should only be concerned with ensuring that the elicitation format is fit for our purpose, and not by the fact that different elicitation formats will elicit different responses. In a study of stated verses actual WTP for insecticide treated nets for malaria Onwujekwe et al. (2005) found that the amount of time respondents were given to complete the task, the amount of information about the scenario respondents were given during the task and attitudes of community leaders, were all found to be associated with divergences between stated and actual WTP. I believe respondents in our study were given enough time (none complained about not having enough time) and information (although as noted earlier some control area women may not have had enough) and were not significantly biased in their responses by other unmentioned external factors.

None of the respondents indicated that they found the WTP task cognitively difficult. This is similar to the 1% reporting difficulties in Borghi and Jan's study of WTP for similar women's groups in Nepal (Borghi and Jan, 2008). The few that did report problems completing the task cited concerns over the flexibility of payment both in terms of payment vehicle (wanting to pay

[23] i.e. with regard to total expenditure and without any suggested amounts or fractions, see §7.3

differently some months) and in terms of being able to consistently pay every month.

Although the theoretical foundations of the quality of life study, the capability approach, can be seen as being an alternative to those of contingent valuation (welfarism) (Smith and Sach, 2009), the results of this study can be used to complement those of the quality of life study. This is discussed further in the following and final chapter (§8.2).

Part III

Application to economic evaluation and health and social policy

Chapter 8

The benefits of women's groups, and wider applications

In this final chapter I aim to bring all of the strands of this thesis together, combining the theoretical and empirical work of the previous chapters to assess what can be learnt regarding the valuation of the benefits of the women's groups but also more broadly, learnings relevant to economic evaluation of interventions in general. I draw on literature on the philosophy, politics and economics of quality of life (§2) and my empirical work measuring quality of life in Malawi (§3, Colbourn et al. (2012a) and §4) as well as the economics and psychology literature concerning assessments of valuation of interventions by their attributes, focusing on discrete choice experiments (DCE), now popular in health economics (§5), and my empirical work conducting best-worst scaling DCE in Malawi (§6) as well as contingent valuation to estimate willingness-to-pay for the women's group intervention (§7). I begin this chapter with an assessment of convergent validity of the quality of life measurement, the DCE and the contingent valuation study and explore possibilities for developing a framework for combining the quality of life measurement and valuation results together. Following this, I summarise what we have learnt about the benefits of the women's groups. I then continue with discussions of important considerations for economic evaluation of interventions in general, focusing on the pros and cons of the methods I have used and other methods for cost-benefit analysis and allocative efficiency, paying special attention to the limitations of measurement systems as well as theoretical, ethical, moral and political considerations. Finally, based on these discussions, I sketch a tentative way forward and provide brief concluding thoughts.

8.1 Convergent validity

The empirical work of this thesis can be broadly divided into observations relating to quality of life and preferences for different areas of quality of life. The former encompasses the work on measurement of quality of life in women's group members, non-members in the same village and women in control villages (§4), as well in women and men in the central hospital in Lilongwe

and surrounding areas as part of the pilot study (§3), and qualitative data gained from both of these studies. The latter encompasses the weighting of the WHOQoL-BREF quality of life attribute-levels by the best worst scaling discrete choice experiments (§6), and also the rating of the quality of life attributes by the simple 1-5 rating-scale method (§6.5.4). Investigation of how influential each of the quality of life facets are on each of the others can also be considered part of determination of preferences for different areas of quality of life, on the grounds that those more likely to lead to higher levels of other facets when they are at high levels should, as 'fertile functionings' (Wolff and De-Shalit, 2007), be preferred.

Table 8.1 summarises the empirical results, and is colour-coded to highlight the different rankings of the domains and facets with respect to each of the measures of observation of, and preferences for, different areas of quality of life just listed. The table is focused on the women's group members, the main focus of empirical investigation in this thesis, and begins (left columns) with the few significant differences, in quality of life scores observed between women's group members and non-members in the same village, and women's group members and women in control areas, after adjusting for the influence of socio-demographic variables and interviewer effects (§4.2.3). These differences were not likely to be caused by the women's groups given evidence of endogeneity of the scores for the physical domain and it's facets *q3 pain*, *q4 dependence on medicine*, *q10 energy* and *q15 mobility*, and the psychological domain *q6 life meaning*, that were all found to be different, and, all except *q6 life meaning*, *lower*, in women's group members. The other quality of life domain and facet scores were not found to be statistically different between women's group members and non-members or women in control areas, in the adjusted analyses described in §4.1.4.1; but were generally either found to be endogenous to women's groups or possibly endogenous.[1]

Given the MaiKhanda women's groups are intended as an intervention to reduce maternal and neonatal mortality (Colbourn et al., 2012c), and not to necessarily improve all areas of quality of life, the lack of observed positive associations of the women's groups with many of the WHOQoL-BREF quality of life domain scores and facets may not be surprising. However, given that endogeneity cannot be ruled out of this cross-sectional study, and strong suggestions that the main quality of life results were distorted by interviewer effects (§4.2.3), the lack of positive results may be more a case of 'absence of evidence' rather than 'evidence of absence'. Future studies would do well to collect similar data over time, which was not possible in this study due to resource constraints, and would perhaps also benefit from more nuanced collection of data on quality of life, for example using more sensitive scales and additional concurrent qualitative data collection, as suggested, along with other ideas, in §4.3.

Table 8.1 continues with summaries of the empirical work related to preferences for different areas of quality of life. First up, in column 7, is the ranking of the quality of life facets (and domains as averages of the facet rankings) obtained from the investigations of how positively they were each associated with scores of the other facets. The extensive calculations involved in these ranking are described in §4.1.4.2, and presented in §4.2.5, where they are also discussed

[1] alternative tests of endogeneity indicated endogeneity or exogeneity for these facet and domain scores, which are marked 'unclear' in column 6 of Table 8.1. See Table 4.3 on page 93 for details of which tests indicated endogeneity or exogeneity. The tests are also described at the end of § 4.1.4.1 on page 81.

at length. Here they are juxtaposed to the weightings obtained from the rating-scale and best-worst scaling tasks (§6), and colour-coded in the same manner, in order to aid visualisation of any relationships between these different measures of preference. Given that the shades of red, orange, yellow and white denoting highest ('best') to lowest ('worst') rank respectively, do not appear to be aligned along each of the rows denoting each quality of life domain and facet, it appears that these four different measures of preference-weighting are not always in agreement. Formal Kendall τ tests of the correlations between the ranks of the different measures are shown at the bottom of Table 8.1, and indicate that the rank of the influence of the facet scores on the others (marked 'A' in the table) is indeed not correlated with any of the other measures, and that the ranks of the facets derived from the simple rating-scale (marked 'B') are not correlated with the ranks derived from the utility weights for the 'bottom' levels of each facet, which are ranked in order of lowest score (see below). However, the rankings from the rating-scale method were found to be significantly correlated with the ranks derived from the utility weights for the 'top'-levels of each quality of life facet (Kendall's rank correlation: $\tau = 0.4416$, $p = 0.008$). This evidence of convergent validity between the two direct methods of preference weighting suggests that not only are the two methods in agreement, but that, when completing the simple rating-scale questions, respondents may be considering how good each quality of life attribute is when it is at a 'top' level, rather than how bad it is, and how important it therefore becomes, when it is at a 'bottom' level.

The lack of correlation between the other measures of preference is perhaps unsurprising. In the case of the directly obtained preference weights (the rating scale and BWS DCE-derived weights: 'B', 'C', and 'D' in Table 8.1) being different to those assumed from the analysis of how much each of the quality of life facets influence the others ('A' in the table), it is unlikely that respondents would be aware of how influential each quality of life facet is compared to the others. Indeed, the qualitative data collected in the focus group discussions indicates that the women were not always aware of all of the WHOQoL-BREF facets, let alone how influential each is in terms of being likely to lead to benefits to additional areas of quality of life. Therefore, the women could not be expected to weight the different areas of quality of life according to how beneficial they are likely to be overall. Even if they were able to, such a calculation also ignores how important each facet is in it's own right, something which could, in certain situations, over-ride any additional influences it has on other facets. In the case of the lack of correlation between the two sets of rankings derived from the BWS DCE ('C' and 'D' in Table 8.1), it is likely that these two measures are incomparable. The ranking of the 'bottom'-level weights was done so that lower weights were given higher ranks. This was on the grounds that preference should be given to those facets that yield lower utility when at their 'bottom' levels, than other facets do at their 'bottom' levels. The idea being that people would want to avoid 'bottom' levels that are worse in terms of low utility than 'bottom' levels of other facets, and would therefore have a preference for focusing on, or for interventions to focus on, such lowest-utility-when-at-'bottom'-level facets. The same rationale, but in reverse, was used to justify ranking the utility tariff weights for the 'top' levels of each attribute in order of how large they are, with largest weights given highest ranks. Preferences for attributes based on how good their 'top' levels are

may not be the same as those based on how bad their 'bottom' levels are, as suggested with respect to the convergence between the rating-scale ranks and the 'top'-level preference weight ranks, but not the 'bottom'-level preference weight ranks, detailed in the previous paragraph.

Table 8.1 continues with a summary of the significant differences between women's group members and non-members and controls, in quality of life scores, weighted by the utility tariffs derived from the BWS DCE, originally presented and discussed in §6.5.5. Again, these differences were adjusted for the influence of socio-demographic variables and interviewer effects. Here, these differences can again be compared with those of the unweighted scores shown in the left-most columns of Table 8.1. It is apparent from such a comparison that many more of the preference-weighted quality of life domain and facet scores were found to be different between the study arms than the unweighted scores. However, as discussed in §6.5.5, given the sometimes counter-intuitive nature of some of the differences, and the lack of apparent mechanisms with respect to the women's groups, the differences in preference-weighted scores, like the differences in unweighted scores, are likely to be endogenous to the women's group members rather than indicative of any effects of the women's groups.

It is possible that the observed differences in quality of life scores between the study arms are related to different capabilities. In order to explore this possibility the differences were mapped onto the capabilities they are each potentially associated with (see Table 2.1 on page 51). From this exercise, it was apparent, however, that none of the study arms were associated with higher, or lower, scores for all the quality of life attributes mapping on to any particular capability or capabilities. It is also possible that differences between study arms in quality of life attributes, determined to some extent by location (such as *q24 health service access* or *q8 security*) could, in cases where the women's group members and non-members together have significantly different scores to control area women, perhaps be explained by village-level effects. Such potential village-level effects were observed, for example, for *q23 living conditions* and *q24 health service access* (both higher in women's group villages, than control villages - dark blue shading in Table 6.5 on page 175). However, they were not observed for other attributes potentially associated with the village the respondent was in, such as *q13 information*, and *q14 leisure*. The picture regarding differences in quality of life between women's group members, non-members in the same village, and women in control areas, therefore remains ambiguous. It requires further investigation, firstly of potential mechanisms and processes creating each difference, and secondly, for potential village-level effects, of village-level characteristics that may lead, or not, to such effects. Such investigations could also benefit from substantial qualitative data collection, given limitations to the quantitative analysis.

Table 8.1 finishes with a crude summary of the available qualitative information obtained from the thematic analyses of the focus group discussions detailed in §3.2.1.2 and §4.2.4, and of the open ended questions concerning the women's willingness-to-pay for the women's groups, summarised in §7.4.4.7. The analysis of the transcripts of the focus groups discussing the WHOQoL-BREF questionnaire showed that the women's group members generally valued all of the areas of quality of life encompassed by the WHOQoL-BREF. However, the qualitative data from which this conclusion was derived was not detailed enough to cross-validate the

Table 8.1: Summary of Results and Convergent Validity

WHOQoL-BREF Quality of life area	Statistically signficiant associations with women's groups, adjusted for socio-demographic variables and interviewer effects (Table 4.3)				quality of life endogenous to WG membership? (Table 4.3)	A) Rank of influence on other quality of life domains or facets (see Table 4.6)	B) Weighting from 1-5 rating-scale 'importance' questions - highest ranks for highest weights (see Table 6.3)	Women's group members preference-weights from BWS DCE on 0-1 utility scale (Figure 6.7)		Statistically signficiant associations with women's groups, adjusted for socio-demographic variables and interviewer effects USING PREFERENCE-WEIGHTED SCORES[c] (Table 6.5)				Qualitative data (FGD: §3.2.1.2, §4.2.4) / CV study: §7.4.1, §7.4.4.7)
	wg vs. non		wg vs. control					C) For 'bottom' level - highest ranks for lower weights	D) For 'top' level - highest ranks for hightest weights	wg vs. non		wg vs. control		
	diff[a]	p-value	diff[a]	p-value						diff[a]	p-value	diff[a]	p-value	
	pos.		pos.		no					pos.		pos.		important, and perceived to be influenced by WG
	neg.		neg.		unclear					neg.		neg.		important
					yes									not important
														not mentioned
Physical domain			-3.5	0.029	yes	1	4.27	0.006631	0.037409			0.0084	0.013	
Psychological domain					yes	2	4.13	0.008055	0.035371	-0.0042	0.000	-0.0059	0.032	
Social Relationships domain					unclear	1	4.18	0.006702	0.033750	-0.0103	0.000	-0.0066	0.000	
Environment domain					unclear	3	4.28	0.006247	0.038907					
1. overall QoL					yes	14	4.28	0.008403	0.033209	0.00371	0.000			
2. Health					unclear	8	4.45	0.000725	0.041294	-0.0033	0.012			
3. Pain	-0.30	0.020	-0.28	0.012	yes	22	4.36	0.000034	0.034396					
4. Medicine			-0.27	0.005	yes	19	3.71	0.005925	0.029052	-0.0071	0.000			
10. Energy					yes	4	4.54	0.005381	0.047786	0.00735	0.000	0.0063	0.000	
15. Mobility			-0.35	0.002	yes	24	3.67	0.005489	0.030187			-0.0034	0.000	
16. Sleep					unclear	18	4.42	0.012965	0.031126	-0.0037	0.000	-0.0036	0.000	
17. Daily activities					unclear	1	4.43	0.007048	0.050203	0.00754	0.000	0.0100	0.000	
18. Work capacity					unclear	3	4.39	0.009573	0.039111	0.00287	0.000			
5. Enjoyment					yes	10	4.51	0.009636	0.045500	0.00358	0.000			
6. Life meaning	0.31	0.014			yes	15	3.92	0.007226	0.038720	0.00218	0.000			
7. Concentration					unclear	11	4.28	0.011761	0.035359			0.0024	0.000	
11. Appearance					unclear	26	3.97	0.006690	0.033580	-0.0061	0.000	-0.0039	0.000	
19. Self satisfaction					unclear	7	4.38	0.013016	0.030848			-0.0040	0.000	
26. Depression					yes	17	3.70	0.000000	0.028216					
20. Relationships					yes	23	4.52	0.005336	0.038349					
21. Sex life					unclear	5	4.10	0.010027	0.028039	-0.0046	0.000	-0.0041	0.000	
22. Support					unclear	11	3.92	0.004742	0.034861	-0.0030	0.003	-0.0033	0.000	
8. Security					unclear	24	4.58	0.006311	0.040941	0.0060	0.000			
9. Envir. healthy					unclear	9	4.10	0.002330	0.037236					
12. Money					unclear	2	4.27	-0.002829	0.034892	0.0050	0.000	-0.0050	0.000	
13. Information					yes	11	4.36	0.007089	0.039567	-0.0031	0.012			
14. Leisure					unclear	26	4.26	0.007209	0.035825	0.0024	0.016			
23. Living conditions					unclear	15	4.00	0.014443	0.045780			0.0030	0.004	
24. Health serv. access					yes	20	4.50	0.007123	0.039416			0.0061	0.000	
25. Transport					yes	21	4.14	0.007648	0.032924	-0.0025	0.002	-0.0034	0.000	
27. Food enough					unclear	6	4.68	0.006903	0.043581			-0.0040	0.000	

Kendall's rank correlation (27 facets)			A	B	C	D
B	Tau_a ≈ Tau_b		0.1852			
	p-value[b]		0.699			
C	Tau_a ≈ Tau_b		-0.0256	-0.0598		
	p-value[b]		1.000	0.999		
D	Tau_a ≈ Tau_b		0.2194	0.4416	0.0085	
	p-value[b]		0.512	0.008	1.000	

Key for colour-coding of ranking of 27 facets	Key for colour-coding of ranking of 4 domains
1	1
2	2
3	3
4	4
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	

[a]Difference between study arms (wg vs. non, or wg vs. control), domains on 0-100 scale, facets on 1-5 scales

[b]corrected for multiple hypothesis testing (testing three hypotheses at once) using the Sidak correction

[c]note that the differences in scores are much smaller than for the unweighted scores, due to the total preference-weighted scores being small as a result of the utility tariff weights being on a 0-1 scale, with all 27 `top' levels adding up to 1. Therefore maximum average domain scores will typically be around 0.2 and maximum average facet scores around 0.03, as shown in Table 6.4.

WHOQoL-BREF: World Health Organisation Quality of Life (QoL) questionnaire
wg: Women's Group member; non: Non-member in the same village; control: Woman in control area ns: not significant
BWS-DCE: Best-worst scaling discrete choice experiment; CV: contingent valuation (willingness-to-pay); FGD: Focus Group Discussion

quantitative measures of which quality of life facets were valued more. Subsequent more detailed investigations would be useful in this regard. The qualitative data was able to tell us that the women valued the women's groups because they perceived them to benefit areas of quality of life synonymous with the WHOQoL-BREF facets *q1 overall*, *q2 health*, *q19 self satisfaction*, *q20 relationships, q22 support*, *q13 information*, *q24 health services access, q25 transport* and *q27 food enough*. Due to the aforementioned limitations of the quantitative data, however, it was not possible to confirm whether the women's groups really caused such perceived improvements.

In summary, the studies involving measurement of quality of life were inconclusive regarding estimation of any effects of the women's groups on quality of life. If they were, however, indicative of how the women's groups effect quality of life, they could be combined with the results of the contingent valuation survey, which was largely successful in estimating how much women in rural Malawi value the women's groups. In such a combination, the average willingness-to-pay value could be taken to be a valuation of the net quality of life benefits, and other benefits such as mortality reduction, of the women's groups.

8.2 Developing a framework for combining the quality of life measurement and valuation results together

The assessment of convergent validity in §8.1 above can be used as a framework for combining the quality of life measurement (WHOQoL-BREF) and valuation (BWS DCE; CV) results together, for the purpose of estimating the overall benefits of the women's group intervention. Such an estimate could then be used in a cost-benefit analysis (§8.4). To reiterate and expand on the conclusion to §8.1, such a framework might involve creating a single 'utility' (/'capability') function of the WHOQoL-BREF quality of life scores weighted by the BWS-DCE-derived preference-weights, and then using the estimated gain (or loss) in this function attributable to the women's group intervention to calculate how much each increment of the function, say 0.01 on a scale of 0 to 1, is worth in monetary terms, by dividing the gain/loss on the function by the estimate of willingness-to-pay for the women's groups from the contingent valuation survey. Similarly, the distribution of the willingness-to-pay estimates from the contingent valuation survey could also be used to calculate the Hicksian compensating variation for gains in each quality of life attribute, if cost was included as an attribute in the DCE, which it wasn't in this study (§5.5.3). Obviously, this approach has limitations, not least the fact that it assumes the quality of life measurement and contingent valuation survey are measuring the same thing, which, given differences in their theoretical foundations (see four paragraphs below), they are probably not. Also, given that the goal of such a framework, and in this case, value of an incremental gain of utility/capability, should be to apply it to different interventions in different settings, the fact that each approach on its own should yield satisfactory comparative evaluation of the alternatives, on its own, without needing to be expressed in terms of the other, means it is less useful to combine the two in a common framework. Using the actual cost[2] of the intervention in

[2]the costing of the women's group intervention was not part of this thesis, but is forthcoming as Colbourn et al. (2013)

place of the willingness-to-pay estimates from the beneficiaries, suffers from the same problems. Nevertheless, unweighted and preference weighted broad quality of life measures, and contingent valuation, are all useful methods of determining the benefits of an intervention and can, especially when both are conducted in a similar manner to assess each alternative under evaluation, be used in broader qualitative (cost-consequence, Multi-Criteria Decision Discourse) or quantitative (Multi-Criteria Decision Analysis) frameworks. Examples of such frameworks are discussed next, followed by important issues to consider in the construction of such frameworks.

Recently, a number of frameworks for Multi-Criteria Decision Analysis (MCDA) (Baltussen and Niessen, 2006) have been developed, including the following. EVIDEM (Goetghebeur et al., 2008), which aims to value interventions by synthesising evidence on health and economic outcomes in an iterative process that takes account of the quality of the evidence and rationale for how the evaluators score each component valued; and which has been applied in Canada (Tony et al., 2011) and, more relevant to Malawi, in South Africa (Miot et al., 2012). The decision-making framework of the Advisory Group for National Specialised Services (2010) in the UK National Health Service, which assesses the commissioning of new specialist services based on a variety of criteria including health gain, societal value, reasonable cost and best-practice. The Analytic Hierarchy Process (AHP) of medical decision-making, which breaks decisions down into different levels of criteria that are analysed from multiple perspectives including the patient and provider (Dolan, 2008). Each of these frameworks has its own strengths and weaknesses. For example, although EVIDEM considers a wide range of previous guidelines for evidence reporting and policy making in the health sector, it is under-developed with respect to extrinsic considerations, especially those concerned with other, non-health, sectors. EVIDEM and AHP are perhaps also too resource and time intensive in their quest to be rigorous, and are therefore not Decision Resource Effective enough. Often MCDA is only considered for specific contexts (e.g. in the case of Program Budgeting and Marginal Analysis, PBMA (Peacock et al., 2009), a less generalised form of MCDA) or specific disease priorities (Baltussen et al., 2010), when it would also be useful in economic evaluation (§8.4) and in ensuring allocative efficiency (§8.5) in general. A new MCDA tool, called Annalisa, which is lean, versatile and, although originally designed as a counter-weight to the complexities of AHP, perhaps capable of overcoming many of the barriers to widespread acceptance of all of the methods discussed above (and below in §8.5 with respect to allocative efficiency), is presented in §8.6. The relevance of MCDA frameworks, and their determination by definition, quantification and weighting of values, is also discussed in §8.6, and §8.7.

However, there are a number of theoretical issues that need to be considered when assessing the importance of any framework to cost-benefit analysis, economic evaluation and social policy in turn. These include theoretical problems with estimating a single utility function, contrasting theoretical frameworks underlying different component parts of the framework, and concerns of equity. Each of these is considered in turn below. In addition to these concerns, there are others related to specific methods used within the framework for economic evaluation, concerns related to ensuring allocative efficiency and concerns of limitations of measurement systems, which are discussed in §8.4, §8.5, and §8.6, respectively, below.

Combining all of the benefits of an intervention in a single metric assumes that they are all, to some extent, exchangeable. There are strong theoretical objections to this stance. For example, the capabilities approach rejects the notion of the single metric of utilitarianism and favours instead a pluralistic approach, whereby a range of different areas of quality of life and capabilities, for example: life, bodily health, emotions, affiliation, each require separate attention (see §2.1.3 and §2.1.5). However, when planning health and social policy, many governments and institutions do assume exchangeability of outcomes in the sense that that funding for often disparate interventions, which are likely to lead to a range of outcomes, some evaluated and others not, comes from the same pot and is allocated according to maximisation of a single metric, for example, QALY maximisation in the UK health service. Separate allocations of funding for different types of interventions aimed at different outcomes are also common, though. These issues are discussed further in §8.5. In addition, as pointed out in §2.3.2, whether explicitly quantified or not, all decisions involving commissioning of an intervention or policy, necessarily are made with reference to an all-too-often invisible or implicit single-metric. That is, given that they are single decisions[3], all qualitative and quantitative factors influencing the decision, whether stated or not, or lexicographic or not, must have been traded-off, summed, interacted, or otherwise used in a joint calculation to arrive at the decision. Methods of judgement and decision-making, and especially those related to Multi-Criteria Decision Analysis (MCDA) are discussed further in §8.6.

The measurement of quality of life can therefore be used to construct a single metric of utility or to measure functionings and capabilities as advocated by the capabilities approach. The latter goes beyond individual preference satisfaction as it considers people's capabilities to do or be, i.e. to lead a more fulfilling life in future, beyond what their current situation and context has led them to desire (prefer). As such, the capabilities approach is often deemed extra-welfarist, as compared to the welfarism of preference-satisfaction utilitarianism. Contingent valuation is welfarist, however, as elicitation of willingness-to-pay is dependent on people's preferences for the intervention, as well as their current circumstances and ability-to-pay. Nevertheless, the two approaches can complement each other, especially as any observed difference in the outcomes of the two approaches[4] informed by the same set of respondents, could estimate the gap between preferences and capabilities (what people are able to desire and what people value (Mooney, 2005)).

The fact that estimates of willingness-to-pay are constrained by ability-to-pay, has implications for equitable allocation of interventions. Inequitable wealth distribution may dictate inequitable intervention and consequently outcome distribution if intervention allocation is dependent to some extent (e.g. as part of an economic evaluation framework) on the willingness-to-pay of local intended beneficiaries of the interventions. Estimates of the willingness-to-pay of alternative groups of people, such as national payers (government or NGO) or foreign international payers (again governments or NGOs) would substantially alter the calculated value

[3] see footnote 11 on page 53

[4] assuming the barriers to creating an exchange rate between the utility function and the monetary willingness-to-pay estimate are overcome, which is obviously a challenge in itself, but could perhaps initially be done by assuming that the mean WTP value corresponds to the mean quality of life gain of the intervention indexed on a utility function scale by a weighting procedure, as suggested at the beginning of this section

of the interventions, but bring forth issues of dependence and sustainability (also see §8.5). The cost per Disability Adjusted Life Year (DALY) approach often assumes international help, as, despite the fact that recommendations such as those of the WHO (WHO, 2001; Hutubessy et al., 2003; WHO, 2003) have low thresholds for cost-effectiveness (an intervention is considered highly cost-effective if it costs less than the per capita GDP of the country to avert one DALY and cost-effective if it is costs between one and three times the per capita GDP of the country), they are still often unaffordable to local governments and NGOs. In pursuing the creation of a variety of capabilities for people, any manifestation of the capability approach need not assume foreign or international assistance. However, the pursuit of a list of 'central capabilities' (§2.1.5), supposedly common to all humanity, may require such assistance, either in terms of finance, when the cost of ensuring all such capabilities is prohibitive for national governments, or culturally and politically, if some of the list of capabilities e.g. equal rights for women, or freedom of association, are not condoned by the local government. If we are to assume international assistance to low-income countries, then combining different approaches into a common framework for economic evaluation would require WTP estimates of such international payers, rather than local beneficiaries, to be elicited as part of any contingent valuation study.

8.3 What have we learnt about the benefits of women's groups?

Overall, we have learnt that the women's groups are valued by women's group members, non-members in the same village and women in other villages, alike. The vast majority of women in each of these groups indicated that they were willing-to-pay every month in order to sustain the groups (§7). The majority of women's group members consulted in focus group discussions also indicated that they valued the women's groups as they perceived them to be beneficial in a number of areas including those related to health, food, knowledge, social support and, health service access. However, due to a number of problems, including those related to interviewer effects and insufficient data to rule-out endogeneity, it was not possible to determine whether such perceptions were manifest as measurable differences between women's group members, non-members in the same village, and women in control area villages, that could be attributed to the women's groups. It therefore remains an open question whether the MaiKhanda women's groups caused, and continue to cause, improvements in measures of quality of life related to those that they are perceived to, or net benefits to other areas of quality of life. Future studies undertaken at more than one time point, on larger samples, and interspersed with iterative qualitative data collection, among other possible improvements (see particularly §4.3, §6.6, §7.5, and §8.2 for additional detailed suggestions), whilst also maintaining the benefit of being contained within an RCT, should provide some answers. These answers would complement the findings from the RCT that indicate that the MaiKhanda women's group intervention on its own reduced perinatal mortality by 16%, and when combined with the health centre quality improvement intervention, reduced neonatal mortality by 22% (Colbourn et al., 2012b).

8.4 Relevance to economic evaluation

The methods I have used to evaluate the benefits of the women's group intervention are all commonly used in economic evaluation, and could be combined in a cost-benefit analysis (§8.2). Like all methods of inquiry, they have advantages and disadvantages.[5] In this section, I begin by summarising these pros and cons, as well as those of competing methodologies, before moving on to a more theoretical discussion of the methods in relation to the goals of economic evaluation and cost-benefit analysis.

Quality of life can be measured in a variety of ways (§2.2). The WHOQoL-BREF was developed with cross-cultural relevance in mind, in a bottom-up people-led iterative process involving many countries (§2.3.1). Its bottom-up development gives it the advantage of better reflecting the values of the intended beneficiaries rather than those of experts. However, more theory-led approaches do not always preclude bottom-up development. For example, the capability approach is flexible in what can be considered a relevant capability in different cultures, especially in the less-defined version of it articulated by Sen (1979) (1989). Some interpretations of the capabilities approach, such as the notion of a list of 'central capabilities' as proposed by Nussbaum (2000) (2011), are less flexible and more top-down though. The fact that the WHOQoL-BREF wasn't developed specifically for measuring quality of life in Malawi could also be considered a disadvantage in that it precludes a more detailed assessment of what matters to the women of rural Malawi. However it could also be seen as an advantage in that its more broadly-applicable nature lends itself to use in multiple situations, for a variety of interventions in any population, therefore enabling comparative evaluation. An alternative approach would be to conduct formative research and build an assessment tool specific to the situation, intervention and population of concern. Such a tool would obviously better capture the benefits of concern to the local population, and therefore perhaps enable more focused evaluation and consequent policy responses. However, in addition to the extra time and expense required to develop unique evaluation tools for each setting, the obvious downside would be the lack of comparability between the tools and a consequent loss of clarity and lack of opportunity for allocative efficiency (see §8.5) in any policy response.

In order to determine the value of the potential benefits of the women's group intervention from the perspective of its beneficiaries I chose to undertake best-worst scaling discrete choice experiments (BWS DCE) using the facets of the WHOQoL-BREF as attributes. This was convenient as it enables weighting of any observed changes in quality of life (measured by the WHOQoL-BREF) by the values obtained in the DCE; however, such an approach restricts the range of potential benefits that could be valued (see §1.4). An alternative approach would have been bottom-up development of the attributes and levels of the DCE in an iterative process using qualitative methods of research, as advocated by Coast and Horrocks (2007) and Coast et al. (2011). The balance of top-down theory-led attribute development, and bottom-up respondent-led attribute development, could of course also be adjusted, for example in the Ph.D. work of Greco (2013). Nevertheless it must be recognised that the inclusion of a limited number of

[5] for a primer on advantages and disadvantages of preference-based measures for assessing the benefits of perinatal care interventions see Petrou and Henderson (2003)

specific levels and attributes in a DCE is a necessary limitation of the holistic picture, required in any attempted quantification of benefits and costs, itself required in any standardised and non-arbitrary economic evaluation.

The use of contingent valuation to estimate willingness-to-pay from the perspective of the beneficiaries was critiqued in the final paragraph of §8.2. The contingent valuation survey undertaken was designed and conducted to ensure incentive compatibility (by the inclusion of a realistic scenario requiring payment) and was made even more robust by getting respondents to summarise their overall household expenditure on a range of common categories, in order to both frame the payment for the intervention in relation to everyday life, and also, encourage the statement of realistic payments by only permitting payments within the envelope of total household expenditure. Qualitative follow-up questions, intending to assess respondents' reasons for payment, also probed for their consideration of existence value, option value and altruism. Alternative methods of elicitation of monetary valuation such as the use of payment cards or bidding games were considered, but are perhaps less sophisticated. Overall, the main concerns with my contingent valuation study, were a small sample size and perhaps incompatibility between the different payment vehicles used, meaning that the different estimates of WTP from each should not have been pooled (see §7.5). There is also the issue of what respondents are valuing in a contingent valuation survey. The outcomes of the intervention and the uncertainty surrounding them as determined by 'objective' scientific study such as a randomised controlled trial (RCT), could be stated as part of the task, or, alternatively, the respondent could be left to reach a less-guided subjective opinion on the benefits of the intervention from a qualitative description of the intervention (as was the case in my study - §7.2.5). Either way, however, the views of outsiders, as encapsulated by either quantitative or qualitative information provided to the respondents, is likely to heavily influence how respondents complete the task, and hence will influence any decisions concerning allocative efficiency arising as a result. Contingent valuation studies with local stakeholders are useful from the point of view of research based on the views of local people, using methods such as participatory rural appraisal (Swallow and Woudyalew, 1994; Chambers, 1994). Methods alternative to contingent valuation for assessing monetary valuation of interventions are much less direct, and depend on converting proxy measures of outcomes to monetary values, for example the setting of thresholds for the value of a QALY or DALY (see §8.5 below).

Economic evaluation of interventions can be conducted in a variety of ways, including: cost-effectiveness analysis (CEA) where the ratio of the costs and the effects (usually in lives or years of life saved) of the intervention and suitable alternative(s) are compared; cost-utility analysis (CUA), the same analysis but with the effects also including measures of utility for the remaining years of life saved; and, cost-benefit analysis (CBA) where the effects are converted into monetary value and the costs are subtracted from them to give the net benefit (NB) (Drummond et al., 2005). The surveys undertaken in this thesis are intended either for CUA (the quality of life measures weighted by the DCE coefficients) or CBA (estimates of willingness-to-pay from the contingent valuation study, either on their own, or combined with the weighted quality of life measures - see §8.2 above). Although there are inconsistencies between the different methods

(§8.2) and, due to the nature of human decision-making the methods are also likely to be internally inconsistent to some extent (§2.2, §5.4, §7.5, §8.6), these methods are the best we have so far and are certainly better than the alternative of intuitive judgement without attempts at reasoned and considered decision-making (Baron, 2008b,c).

The nature of quality of life measurement could also lend itself to an operationalisation of the capabilities approach (§2.1.5, §2.2). As discussed in §2.2.4, there are a number of issues that need to be considered to ensure a well-reasoned and thorough operationalisation of the capabilities approach, and the jury is still out as to the best way to proceed in this regard. In a recent editorial, Coast et al. (2008b) argue that the capabilities approach offers a richer evaluative space to health economics, but that more thought is required about decision-making principles, specifically with regard to consideration of equity-oriented goals, such as ensuring a 'decent minimum' of capability rather than capability maximisation (which would require a shift in thinking given that the 'maximisation' principle, whether in relation to health in decision-maker conceptions of evaluation, or in relation to utility in welfarist conceptions of evaluation, is firmly established in health economics). These ideas are picked up and discussed along with other thoughts on the way forward for economic evaluation in §8.7.

In addition to the above, there are, however, further important points to consider in any deconstruction of economic evaluation. These include the importance of processes as well as outcomes, i.e. the importance of the means as well as the ends; the importance of future benefits and costs i.e. the time horizon and discounting used in the analysis; and how to communicate uncertainty and risk and ensure respondents' understanding of it in primary data collection. Each is discussed in turn. For the women's group intervention, and other population-based health, social care or development interventions, the means of attaining the outcomes are not usually an issue, as they are usually painless and, sometimes, in the case of women's groups, enjoyable. Some interventions, e.g. certain medical procedures such as radiotherapy and chemotherapy for cancer; or political upheavals and revolutions, do require pain, however, for their intended outcomes to be achieved. Processes, mechanisms and means are therefore important and should be included in any economic evaluation, as well as the outcomes if the aim of the comparative analysis is to maximise quality of life. Although in the case of the medical procedures, people are willing to suffer in order to have the chance of a better quality of life, and there is also evidence from the psychological literature of distinctions between the 'experiencing self' and the 'remembering self' (§8.6), the measurement of that initial suffering should still matter in any conception of ethics or justice that is not completely consequentialist in nature. Many agree that certain ethical standards and boundaries should be upheld in the conduct of any intervention and that rule-based or deontological ethics are important to some extent. An alternative school of thought to both consequentialist and deontological ethics is pragmatic ethics, the central idea of which is that societies progress morally via inquiry, in much the same way as they progress scientifically (Dewey, 1998). This theory is also attractive but it is perhaps more relevant to long-term processes and societal evolution over decades and centuries rather than the short- to medium-term evaluation of interventions.

The time horizon of any economic evaluation is still important, though. Costs and bene-

fits should be considered over a period relevant to the beneficiaries and implementers of the intervention, as well as to the policymakers that the economic evaluation seeks to influence. The WHO (2003) recommends a time horizon for economic analysis of 10 years. In my study the time horizon of the benefits to quality of life was not focused on. The WHOQoL-BREF asks about a person's quality of life in the last two weeks, but no attempt was made to assess possibilities for future gains in quality of life over subsequent years. Indeed, such information, and especially in relation to the impact of the women's group or other interventions, is of course unknowable to the respondents, who could perhaps only speculate on the future, which always remains very unpredictable. The only way to obtain information on quality of life over a 10 year (or other length) horizon would be by repeating the survey throughout, or at least at the beginning and end, of this time period, which was not pursued in this study due to resource constraints (§2.2.5). The valuation of the quality of life states (§6) and the contingent valuation of the women's groups (§7) were also only assessed at a single time point for this reason. Without repeated assessment of benefits and a specified time horizon for the economic evaluation undertaken in this thesis, the issue of discounting future benefits and costs does not come into play. However, in forthcoming economic evaluation of the MaiKhanda women's groups and quality improvement interventions (Colbourn et al., 2013), which will include an appropriate time horizon, discounting does become important. Discounting future costs and benefits makes sense, for a variety of reasons, including: preference for immediate gains; assumptions concerning payment of interest and inflation; the assumption of declining marginal utility due to continued human progress throughout history meaning that future people will be better off than people now; and future risks and uncertainties (Baron, 2008d). All these reasons should be considered when setting the annual percentage discount rate.

Previous studies have documented problems in communicating risk and uncertainty of outcomes to respondents (e.g. Lloyd, 2001; Mahmud, 2006; Kahneman, 2011g). In this study, there was no attempt to communicate or capture uncertainty regarding quality of life states in the quality of life valuation exercise (§6) or the effects of the intervention in the contingent valuation exercise (§7) as it was felt that this would overcomplicate already cognitively-demanding tasks. Therefore, in addition to not considering future effects (see previous paragraph), the valuations of the women's groups and quality of life by the respondents do not take account of any uncertainty in the delivery of the intervention or its effects on quality of life. There has, however, been an attempt to limit and take account of uncertainties in the analyses by ensuring an adequate sampling design (§4.1.2) and by quantifying the statistical uncertainty in the analyses (§4.2, §6.5, §7.4). As such, at least some uncertainty can be accounted for in any decision analysis conducted by policymakers based on this work.

To finish this section, despite these additional considerations, our overall conclusion that the current methods of economic evaluation are better than the alternative of intuitive and ill-considered decision-making should remain unchanged. In the following section I discuss allocative efficiency, which ideally, in one form or another, should be the overall goal of economic evaluation.

8.5 Allocative efficiency

Economic evaluation aims to evaluate the cost-effectiveness or net benefit of an intervention in comparison to other alternative interventions. At a meta-level all relevant (existing and implementable) interventions should be considered in reference to an overall policy goal e.g. in health, the maximisation of health gains measured in DALYs or QALYs or other more comprehensive measures, or sets of measures (§8.2). Such an analysis has the goal of ensuring efficient allocation of the available resources, which if the goal is to maximise QALYs, for example, would involve spending resources on the most cost-effective interventions in terms of least cost per QALY gained, until the resources were spent and the most QALYs possible gained. In practice, the realisation of allocative efficiency is obviously not straightforward. There are a number of considerations such as: the relative size of the burden of the disease (or other) problem each intervention aims to address[6]; the scalability of the interventions; ensuring an equitable balance of diseases/problems are targeted; political considerations and other influences preventing adherence to the chosen framework of allocative efficiency; whose perspective of allocative efficiency is important; and, uncertainty in the estimates of costs and benefits. In this section, I consider each of these problems in turn, before reviewing real-life attempts at ensuring allocative efficiency in the UK and Malawi. I finish the section by briefly considering the potential for my research to contribute to allocative efficiency. First though, I focus on the main theoretical issues that should be considered in the choice of the framework for ensuring allocative efficiency.[7]

As presented and discussed in §2, there are a variety of theoretical approaches to priority-setting in the public sector of society. Perhaps because the health sector is too often seen as separate from the rest of public policy (Wolff and Orr, 2009; Orr et al., 2010), however, the concerns of welfare economics (maximisation of benefits for all individuals in a Pareto-optimal manner, involving trading-off benefits and gains according to individual preferences), and extra-welfarist approaches such as the capabilities approach (maximisation of capabilities), are all too often ignored in current theoretically under-developed approaches to priority-setting, such as QALY maximisation (Coast, 2004). Since its first use in healthcare priority setting the QALY has been controversial (Loomes and McKenzie, 1989), and perhaps more importantly, maybe because of the way their use came about, misunderstood and strongly debated (see e.g. Rawles, 1989; Mooney, 1989; Rawles, 1990; Wagstaff, 1991; Quigley, 2007; Claxton and Culyer, 2008) and articles referenced in these papers for just a few of the many examples in the literature). Yet the QALY, along with similar measures such as the DALY, is still commonly used in economic evaluation and priority setting today, albeit with perhaps a recent shift towards other considerations (see the penultimate two paragraphs of this section below). In addition to individual members of society, it can also be important to consider the perspective of the community in priority setting. Mooney advocates, for example, communities or societies collectively making decisions to allocate resources to different groups within them, and the groups then deciding how to use the resources in order to benefit their group, or individual well-

[6] i.e. for rare diseases it will only be possible for even the most cost-effective interventions to save a certain limited number of lives or result in a certain limited gain in QALYs.

[7] see §8.2, below in this section, and §8.6 for a discussion of some of the more methodological considerations surrounding the choice of framework for priority setting.

being and agency (capabilities) (Mooney, 2005). In this paper, Mooney describes an example of such priority setting in Australia; however, like more recent attempts in the UK (NICE Citizens Council, 2008), the focus was more on health only rather than broader capability or community concerns. I now turn to other issues that need consideration in any exercise aimed at efficient allocation of public resources.

When considering the potential overall effect of an intervention, the absolute size of the problem in the population that the intervention seeks to address, and the potential for scaling-up the intervention to address the problem in the whole population, are both of importance. Ideally, if the aim is pure maximisation of a health metric, an 'expansion path' following the Incremental Cost-Effectiveness Ratios (ICER) of relevant interventions should be followed whereby resources are spent on each intervention in order of cost-effectiveness, moving on to the next intervention only when there are no more gains from the previous more cost-effective intervention possible (i.e. when either the disease is eradicated or the population is saturated with the intervention) (WHO, 2003; Drummond et al., 2005). Obviously in practice, additional considerations, such as equity and politics (see the following four paragraphs) come into play, preventing the manifestation of such an 'expansion path' even if it were accurately known (see discussion on uncertainty five paragraphs below). The costs and benefits of the intervention should be determined with reference to the anticipated scale of the roll-out of the intervention in the total population, taking account both of economies of scale for the costs and potential dilutions (or concentrations) of effects. In addition, the overall budget and the affordability of adding a new intervention need to be kept in mind by decision-makers (Sendi and Briggs, 2001).

The goal of pure maximisation of total health in the population (as measured by any metric) is deficient when the different health needs of different age groups, genders, localities, socio-economic and other demographic strata, are considered (Wagstaff, 1991). Simple maximisation could easily result in a situation where the health needs of whole sections of society, such as the old - who often require more expensive interventions, remain unaddressed. Therefore, to ensure a certain amount of equity in the provision of interventions across society, interventions must be divided into mutually-exclusive groups, each dealing with specific disease priorities or, better still, specific population groups.

Priority setting could indeed be based on a number of criteria, including poverty reduction, age of target group, and severity of disease, as well as magnitude of total health effects and the cost-effectiveness of the interventions (Baltussen et al., 2006, 2007). Additional political considerations include: how different groups in the population benefited from previous or historic allocations of resources; and the importance of specific groups of intended beneficiaries, or even companies undertaking the interventions, in securing the power of the government (decision-makers)[8]. Both beneficiary and provider lobby groups can wield considerable influence in the priority-setting policy arena, especially if they have galvanised the support of the media and/or other powerful groups for their cause (see e.g. Claxton (2007), which contains a brief discussion of lobbying from pharmaceutical companies). Other influences preventing adherence to the stated framework of allocative efficiency include: deliberate (or accidental) mistakes by the

[8]this is an important consideration in any assessment of prioritisation and causes of *de facto status quo* allocative (in)efficiency, rather than an ideal!

analysts determining allocative efficiency or the policymakers interpreting the results and acting on them (deliberate mistakes perhaps due to the political considerations just mentioned); and, consideration of alternative perspectives, which I turn to next, and sources of uncertainty in the analysis, discussed subsequently.

The outcomes, and hence the interventions that are included in an assessment of allocative efficiency, obviously depend on whose perspective is chosen. From the perspective of policymakers and other professionals, assessments akin to those described in this section and chapter may well be appropriate. However, from the perspective of some of the intended beneficiaries, and especially those who come from very different social and cultural backgrounds and have very different beliefs[9] and customs, to those of professional decision-makers, very different assessments could be the norm. In order to ensure some measure of scientific 'objectivity', the method of determining allocative efficiency must at least be standardised, and consistently applied across interventions and local settings, and given that allocative efficiency is usually determined by governments (see examples specific to the UK and Malawi below), there is therefore, perhaps, no room for the unscientific opinion of beneficiaries in this process. Nevertheless, as a bare minimum, researchers and decision-makers should aim to understand the subjective perceptions of interventions and resulting outcomes held by the intended beneficiaries, and ensure beneficiaries are generally in agreement with the decisions being made on their behalf. Decisions for allocative efficiency, therefore, may not be owned by the intended local beneficiaries, and as such, any system of allocative efficiency, although 'objectively' benefiting people to some extent, may benefit them less 'subjectively' i.e. according to their own current hopes and desires. Adaptation to circumstances and changes in hopes and desires following education and increased knowledge of possible life states, are of course very important here and are a reason for favouring some degree of top-down influence of decision-making, ensuring allocative efficiency (see §2.1.5). Alternative ways of knowing are also discussed briefly in the following section on limitations of measurement systems (§8.6).

An attractive proposal for priority setting is focusing on the most disadvantaged, whilst still adhering to pluralistic methods of measurement (§2.1.5) (Wolff and De-Shalit, 2007). Wolff and De-Shalit suggest the identification of two objective and one subjective measure of disadvantage for each functioning, in a method akin to the 'York model' (Bradshaw and Finch, 2003), and stress the importance of risk (security of functioning) in terms of 'dynamic clustering of disadvantage' i.e. one disadvantage leading to another e.g. job loss, then homelessness, then social exclusion, then illness. The goal of policy should be that disadvantages do not cluster i.e. some will be worse-off in some areas but better in others, so we won't be able to clearly tell who the worst off are (Wolff and De-Shalit, 2007). Objective measures are useful to give a cardinal measure of disadvantage, which is also needed in addition to ordinal measures, for a number of reasons, e.g to ensure required thresholds are met, to check the progress of an intervention, or to ensure disadvantages are de-clustered in a positive way (increasing the capability of the poor rather than decreasing the capability of the rich). Wolff and De-Shalit (2007) argue that where there should be a focus on declustering advantages, it should be a focus on institutional (unfair)

[9] for example, in rural Malawi the belief in witchcraft is still very common

advantages (e.g. preferential treatment of certain well-off groups due to tradition) rather than natural advantages (e.g. education leading to fulfilment - because education is a natural fertile functioning, to decouple it from leading to fulfilment would be inhumane). Focusing on clustered disadvantage by focusing on 'corrosive disadvantages' and 'fertile functionings', is perhaps more pragmatic than more complex evaluation, such as comparing 20 different weighting (of capabilities/functionings) schemes to see if the same people are consistently at the bottom of the pile or not (which could be done by governments) (Wolff and De-Shalit, 2007). Wolff and De-Shalit (2007) try to avoid 'philosophical indulgence' and focus on realistic social policy, bearing in mind the need for allocative efficiency and the fact that without any recommendations from egalitarian theorists and philosophers, public policy is usually made as a result of the efforts of lobbying and special interest groups. However, they also argue, not everything should be sacrificed for efficiency e.g the very worst-off shouldn't be completely abandoned because their problems are too expensive (in terms of time and money) to solve - and indeed they are not, as much is currently spent on research to ultimately benefit these people (Wolff and De-Shalit, 2007). The 'duty of care' means we should not be indifferent to the suffering of the worst-off, and should at least help them directly in some way too. Finally, in any approached aimed at declustering disadvantage, Wolff and De-Shalit also stress the importance of having some amount of equity of provision. They point out the need to spend some resources on all people in order to promote affiliation and buy-in from society: for example, the rich need some things back from the state from their taxes, and the universal provision of some goods avoids humiliation of the poor in receiving hand-outs (Wolff and De-Shalit, 2007).

Sources of uncertainty in economic evaluation include: inadequate sample design; limited sample sizes leading to limited statistical precision of estimates of costs and benefits[10]; respondents not answering the questions in a manner consistent with the theory underpinning the survey or at least making some, usually unknown, number of mistakes in completing the survey (§5.4, §8.6); and data on both known and unknown 'externalities' of interventions not being collected (Labelle and Hurley, 1992). Clearly, in sum, all of these sources of uncertainty could significantly affect the accurate determination of allocative efficiency. Nevertheless, as concluded in the previous section with reference to economic evaluation (§8.4), the presence of such uncertainty and limitations should not preclude attempting analyses aimed at ensuring allocative efficiency. After all, what is the alternative? Surely it would be less fair and less in line with the explicit policy goals?

In the UK, QALY maximisation is the favoured, though not exclusive (see below), approach to allocative efficiency in the health sector (NICE, 2008a). Interventions are evaluated by their cost-effectiveness in terms of cost per QALY gained and are ranked in relation to alternative interventions within mutually exclusive disease-specific groups via the calculation of ICERs (Drummond et al., 2005; NICE, 2008a). The UK National Institute for Health and Clinical Excellence (NICE) typically recommends the funding of an intervention if it costs less than £30,000 per QALY, although this does vary (Culyer et al., 2007). Allocative efficiency is therefore mainly decided within a Cost Utility Analysis (CUA) framework rather than a broader Cost Benefit

[10] this applies to all studies, as even large sample studies yield some, albeit small, amount of statistical uncertainty

Analysis (CBA) framework, perhaps due to the relative ease with which the cost per QALY of health interventions can be determined, as opposed to the total net monetary benefit, which requires consideration of additional 'externalities' of the interventions, not always immediately apparent to respondents answering questions aimed at eliciting the utility of the intervention in terms of QALY. QALY are usually estimated using the preferences of the population for different health states, corresponding to those experienced by people with the disease that the intervention is aimed at addressing. Health states are typically assessed on a scale anchored at death=0 and perfect health=1, using methods such as the Visual Analogue Scale (VAS), or more popular recently as possibly more robust, the Time Trade Off (TTO) (or Person Trade Off - PTO) and Standard Gamble (SG) techniques (Drummond et al., 2005). Multi-attribute utility measures assessing health-related quality of life (such as the EQ-5D, HUI-3 or SF-6D, see §2.2.2) are also commonly used to weight health states in the calculation of QALYs (with the weights of the different multi-dimensional states typically determined by TTO or SG exercises undertaken on large samples of the general public, and then applied to specific health outcomes defined in terms of specific multi-dimensional states). In practice, decisions about the funding of health interventions in the UK National Health Service (NHS) have of course been influenced by a variety of other factors apart from pure QALY maximisation, such as: the severity of the disease; the target group being children, disadvantaged groups, or people at the end of their life; stakeholder persuasiveness; the search for acceptable sub-groups; and, whether the intervention is aimed at primary or secondary prevention, to name a few (NICE, 2009). However, cost-effectiveness, together with uncertainty and burden of disease, perhaps explain a lot of NICE decisions after the QALY maximisation approach was adopted (Devlin and Parkin, 2004). There is growing evidence, however, that people value QALY differently in different situations e.g. QALY are weighted more in children and those with dependents; for severe diseases; for those with worse lifetime health prospects; and if they reduce health inequalities (Dolan et al., 2004); and that, consequently there are many situations when people would like the QALY maximisation approach to not apply (NICE Citizens Council, 2008; NICE, 2008b). However, Bryan et al. (2002) found public perceptions to be more in tune with QALY maximisation. I return to such considerations in my discussion of the way forward for economic evaluation and health and social policy in §8.7.

In Malawi, a low-income country with a low budget for health (despite donor aid), priority setting is also based on the cost-effectiveness of interventions. Although less complicated analyses are employed, interventions deemed part of the Essential Health Package (EHP) are prioritised for funding and implementation. These cover the major causes of death and disease in the country and have recently been well-articulated in terms of cost per DALY and total DALY burden of disease in the new Health Sector Strategic Plan for 2011-2016 (HSSP) (Government of Malawi Ministry of Health, 2011, p.32). Both the EHP and the HSSP are informed by the situation regarding the burden of disease in Malawi, measured by large national surveys such as the DHS (National Statistical Office (NSO) [Malawi] and ICF Macro [USA], 2011) or MICS (National Statistics Office [Malawi] and UNICEF, 2008), and by estimates of cost-effectiveness of the interventions in similar contexts provided by the WHO and others (Murray and Lopez,

1996; WHO, 2003, 2004). Clearly the EHP and HSSP reflect the priorities of the Malawian health sector, though perhaps they have also been influenced by donors, both by technical inputs to the burden of disease and cost-effectiveness analysis estimates, and also by the fact that some more expensive and less cost-effective interventions have been included because they are entirely funded by donors, such as the branded (Thanzi) Oral Rehydration Therapy funded by UNICEF and USAID, or antiretroviral and TB drugs funded by the Global Fund for AIDS, Tuberculosis and Malaria. Other interventions that are partly included in the EHP and partly outside it, are those such as water and sanitation interventions, also funded by other ministries. In addition, some 'value for money' interventions such as First Aid for volunteers as part of trauma services are not yet in the EHP, although are being trialled, but others, such as road traffic accident prevention, are entirely the remit of other government ministries (Government of Malawi Ministry of Health, 2011, p.33). The use of DALYs in priority-setting for low-income countries such as Malawi, is clearly distinct from the use of QALYs in high-income settings such as the UK (see previous paragraph). DALYs differ from QALYs in that they are a measure of health loss rather than health gain, but also in that they commonly include different weightings for young, middle and older age groups (Fox-Rushby and Hanson, 2001).

As detailed in §8.4, the empirical studies carried out in this thesis cover a range of methods of economic evaluation. This research, combined with data from improved (§4.3, §6.6) and repeated surveys, could enable the placement of the women's group intervention within the allocative efficiency framework for the Malawi health sector described above.[11] Given that the current EHP framework does not include consideration of utility weights of respondents in Malawi, or estimates of willingness-to-pay, my research also has potential to influence developments towards more considered economic evaluation and methods of assuring allocative efficiency in the health sector (also see §8.7).

8.6 Limitations of measurement systems

Whether we are considering economic evaluation in general (§8.4), allocative efficiency (§8.5), or the evaluation of one particular intervention such as the women's group intervention (§8.1-§8.3), we must be mindful of the limitations of systems of measurement. These include: the way people complete questionnaires and tasks designed to elicit the information used to make decisions; the previous evidence, and perhaps just as important the experiences that people consider when they make decisions; the way decision-makers view different values and systems of measurement, and consequently, whether and how they consider each system when making decisions; as well as other factors influencing decision-makers. These are each considered in turn, before I finish this section with some concluding thoughts about measurement and decision-making.

As discussed in §5.4, and in §2.2 specifically in relation to measurement of quality of life, there are a variety of influences on how people complete questionnaires, especially choice-based tasks, aimed at eliciting the information to be used by decision-makers in economic evaluation (and other areas of science). There is a lot of evidence that the rational model of choice

[11] the forthcoming economic evaluation of the women's groups by Colbourn et al. (2013) is also important in this regard as it deals more specifically with their cost-effectiveness.

behaviour assumed by much of neoclassical economics is false, and that instead humans, possibly as a result of their evolutionary history, employ various heuristics and quick-thinking strategies that reflect a rationality bounded by constraints of human cognition, time and other factors associated with the decision-making environment (§5.4). As such, the way respondents complete the choice-based tasks increasingly used in economic evaluation may be biased according to the economic theory underlying the tasks. Respondents may also make, a usually-unknown, number of mistakes when completing a survey, either accidentally, or 'intentionally' if they have *miswanted* (see three paragraphs below) their goals. There is therefore a need to take account of such departures from theory in any consideration of the results of choice-based (and other) tasks that are used to inform economic evaluation, either explicitly in the mathematical and statistical modelling of the results, or qualitatively in a discussion of the results and their application to policy-making.

In his recent book covering his life's work (and those of others) on decision-making, the psychologist and Nobel Laureate in Economics, Daniel Kahneman (2011n), distinguishes between two kinds of thinking: fast and intuitive (System 1) and slow and deliberative (System 2). Perhaps it is more often the case that although analysis and policy-making needs to be done by slow System 2 thinking, it is all-too-often limited by primary data collection biased by fast System 1 thinking. Although, in the case of this study, it could be that unfamiliar tasks, such as the discrete choice experiments, with no precedents, result in more considered System 2 thinking. However, jumping to conclusions is often hard to avoid, with evidence suggesting that the What You See Is All There Is (WYSIATI) bias is pervasive in many areas of decision-making, including those related to policy-making! (Kahneman, 2011l). Kahneman believes that System 2 can often be more of an endorser of the (often irrational) impressions of System 1 rather than an enforcer against such views, and that humans are not self critical enough. Although we can (sometimes) be persuaded by new evidence, we often are not, as our previous attitudes and beliefs, even if 'irrational' and based on inadequate evidence, are hard to change (this is the *affect heuristic* proposed by Slovic et al. (2002)). Even if we are persuaded by new evidence we still often read things into the new evidence that were not stated, and jump to erroneous conclusions! (Kahneman, 2011a). Jonathan Baron (2008a), another eminent psychologist, urges 'actively open-minded thinking' to overcome this, which, he believes, can be taught to good effect.

Kahneman also makes the distinction between our *experiencing self* (experienced utility -§2.1.3, hedonic wellbeing -§2.1.2) and our *remembering self* (decision utility -§8.4, §8.5, 'wantability'), pointing out that what we want may not always coincide with maximising good experiences due to the fact that our memories of past experiences are often significantly biased (Kahneman, 2011m). The major biases of memory of pleasurable or painful experiences are *duration neglect* and *peak-end bias*. Duration neglect is due to the fact we are prone (via our 'System 1' thinking) to average previous experiences rather than sum or take an integral (area under the curve of time against pleasure/pain intensity) of them. Duration neglect is often accompanied by peak-end bias in that we are more likely to remember an experience as being better than another similar experience if it ended better, even if the majority of it was worse than

the alternative experience. Illuminating examples include the following three studies. First, the 'cold hand' experiment by Kahneman et al. (1993) whereby 60 seconds of higher pain (colder water) followed by 30 seconds of less pain (still painful slightly-less-cold water) is preferred to be repeated than the 60 seconds of higher pain on its own. Second, a study by Redelmeier and Kahneman (1996) measuring self-reported levels of pain from colonoscopy procedures both during and after the event that found those reporting higher peak pain during the procedure remembered the procedure as less painful than those reporting less peak pain during the procedure if the procedure ended with a period of less pain. Third, an experiment by Diener et al. (2001) whereby, after evaluating hypothetical life histories people rated the life of a woman living a moderately happy life and dying aged 30, as desirable as that of a woman living a life of the same moderate happiness and dying aged 60 (duration neglect); and also rated the life of a woman living a moderately happy life until death at aged 30 as *more* desirable as the life of the same woman living the same moderately happy life until aged 30 followed by another 5 years of slightly less happiness and death at aged 35. Clearly, these biases have implications for the rational-agent model of decision-making, which assumes that decision utility is based on experienced (hedonic) utility i.e. that the two are the same, when empirical evidence suggests this is not the case. Also see §2.1.6, e.g. the study by Kahneman and Deaton (2010) showing that earning more money increases remembered overall life satisfaction but not experienced daily emotional wellbeing. How should policymakers take account of the difference between experienced utility and remembered utility? Given most decisions are made by our remembering self, it can be said that we *are* our remembering selves. However, if memory is biased and all experiences are ultimately forgotten, surely what people actually experience is more important? On the other hand, because a person's well-being throughout their lifetime is also determined by their remembered utility of the past, perhaps it could be just as important? Should investments in interventions be guided by how much people fear the conditions the interventions are aimed at stopping? Or by the immediate experience of pain? Or by the remembered experience e.g. by how much patients are willing to sacrifice, say, additional years of healthy life, to be cured of the condition? (Dolan and Kahneman, 2008). Perhaps it is important to consider both the remembering self and the experiencing self in policies aimed at increasing well-being and quality of life (see §8.7) (Kahneman, 2011m).

Considering outcomes in relation to original goals is also important, e.g. in a 20-year follow-up study of college students those aiming for high incomes had greater life satisfaction 20 years later if they had high incomes (and greater dissatisfaction if they didn't) than those to whom money was less important, and having harder-to-achieve goals in adolescence, notably being good in a performing art, was associated with lower life satisfaction in adulthood because such goals were usually not achieved (Kahneman, 2011k). However, over time, people adapt to situations, and even those they think will make a big difference to their lives e.g. marriage, or paraplegia, fade (Kahneman, 2011k). People therefore are prone to *miswanting* - not being happy because they want the wrong things in the first place, rather than because they don't get what they want (Gilbert and Wilson, 2000). The capability approach (see §2.1.5), which overcomes problems such as preference adaptations and arguably bypasses the differences between

remembered utility and experienced utility, is therefore perhaps a promising way forward for policy aimed at increasing quality of life. That is, of course, providing it can be operationalised (see §2.2.4, 6th paragraph of §8.4 above, and §8.7 below).

Emotions, other non-cognitive factors (e.g. imitation), and culture also have roles in bounded rationality (Gigerenzer and Selten, 2001a), and, especially given they are often overlooked motivators of decisions, are useful to consider as they are likely to affect cost-benefit analysis and social policy. Emotions are key non-cognitive - therefore often deemed "irrational" - domain or situation-specific mechanisms of stopping search for alternatives: for example, a mother doesn't even consider undertaking a cost-benefit analysis of rearing her child, as her love for the baby outweighs everything else (sleepless nights etc.) to the point where not raising the infant is not even considered (Gigerenzer, 2001). Ecological (real-world) rationality in terms of cognitive and emotional heuristics can be extended to social rationality: social norms, imitation, fairness, transparency, and accountability are all useful for maintaining social structures and co-operation for mutual gain (Gigerenzer, 2001). Clearly the roles of culture and social norms are also important. Although largely overlooked in favour of psychology in this thesis, it is worth both acknowledging and taking a look at the limitations of measurement systems from an anthropological perspective (Clifford and Marcus, 2010). In particular, interviewer effects are unavoidable, due to the differences in culture between the interviewer (an outsider) and the interviewee (Davis et al., 2010), and perhaps also due to responses to unintended cues (see e.g. Despret, 2004) from the interviewer to the respondent and vice versa. As such the interviewee is unlikely to interpret the questionnaire or choice task exactly as intended by the interviewer or the researcher. Motivation dependent on emotional, cultural and social factors clearly influences decision-making, and also politics, including what are deemed "appropriate goals for society" (see §2.1.7) as well as appropriate means of determining how to achieve such goals (see §8.4, §8.5 and below). Cognitive calculations, whether informed by complex computer-based analysis or otherwise, are certainly not the only (and often not even the major) author of important decisions in health, social, or other areas of policy.

The way decision-makers consider different systems of measurement depends on the values they hold to be important. The first step in any multi-criteria decision analysis (MCDA), economic evaluation of an intervention being an example of an MCDA, should therefore be identifying and defining the values to base the decision on (Orr et al., 2011).[12] For the example of appraisal of new medicines under the proposed Value Based Pricing (VBP) scheme in the UK health service, Orr et al. (2011), define health and quality of life (well-being) gains, social values, industrial considerations, policy drivers and technical consideration as the main types of values to be considered, for reasons of ethics, expert opinion, public opinion, legal opinion, and policy and precedent. In practice, due to inadequate consultation and inadequate cross-disciplinary/inter-sectoral dialogue, decision-makers may not consider all of these multiple kinds of reasoning, and consequently, many important types of values may not be considered, let alone important values within each type (of which there are many, as detailed in Orr et al. (2011)).

Once the values to base the decision on have been determined, a system of scoring each

[12] the following steps are then to quantify the values and determine their weights. This is discussed in the following paragraph.

value so as to comparatively rate each alternative intervention being evaluated has to be worked out, along with a relative weighting of the importance of each value compared to the other values. In his illuminating work, Dowie (Dowie, 2009; Dowie and Kaltoft, 2012; Dowie, 2012) sketches categories of decision-making methods with reference to equivalent categories of methods determining the beliefs and preferences that each contribute to the decision-making, all on a continuum (based on the work of Hammond (1996)) of intuition to analysis ratios.[13] The resulting map, dubbed JUDEMAKIA and reproduced with permission as Figure 8.1, starts from decisions based on the gut-instincts of Darwinian Evolution, passing through other categories before centring on decision analysis informed by computer models, standard gamble preference elicitation techniques and many of the other belief and preference technologies (see footnote to figure), and ending at robotic decisions based entirely on laboratory experiments that (tortuously) don't consider preferences at all. A third axis of altitude (coming out of the page), representing the quality of the belief, decision or preference data, is invisible on the JUDEMAKIA map. As explained in the extensive footnotes to Figure 8.1, decisions concerning evaluation of health interventions and allocative efficiency usually take place somewhere either in 'ANALYSIA' (e.g. QALY maximisation) or 'TIABIMIA' (TIABIM: Taking Into Account, Bearing In Mind; e.g. other considerations such as equity, impacts on well-being and other sectors), the former of which, as we have seen, often does not consider enough relevant values and the latter of which often lacks rigour and quantitative measures enabling consistent decision-making. In order to facilitate more consistent decision-making, whilst also optimising the time and resources spent on the decision-making process itself, Dowie proposes the use of Annalisa (Cunich et al., 2011; Dowie, 2012). Annalisa is a simple software tool he has designed to compare alternatives, by scoring and weighting the values they are being judged on in an easy-to-comprehend one-page dashboard. Decision Resource Effectiveness Analysis (DREA) - deciding how to decide, is too often not considered despite the fact that, as stated in §2.2.7 and §5.4, given limited time and resources, it is clearly important. There is currently a lot of focus on increasing scientific rigour in healthcare decision-making (see e.g. Drummond et al., 2008a), and all too often issues of practicality, alternative important values, and the limitations of measurement systems discussed above, are not considered. By striking a good balance between intuition and analysis, rigour and relevance, and complexity and practicality, tools like Annalisa, which also have the benefit of transparency, may have good decision resource effectiveness (Dowie, 2009; Dowie and Kaltoft, 2012; Dowie, 2012). However, the difficult task[14] of designing the methods of determining the relevant values (attributes), scores and weights in the first place, explored extensively in this thesis[15], remains.

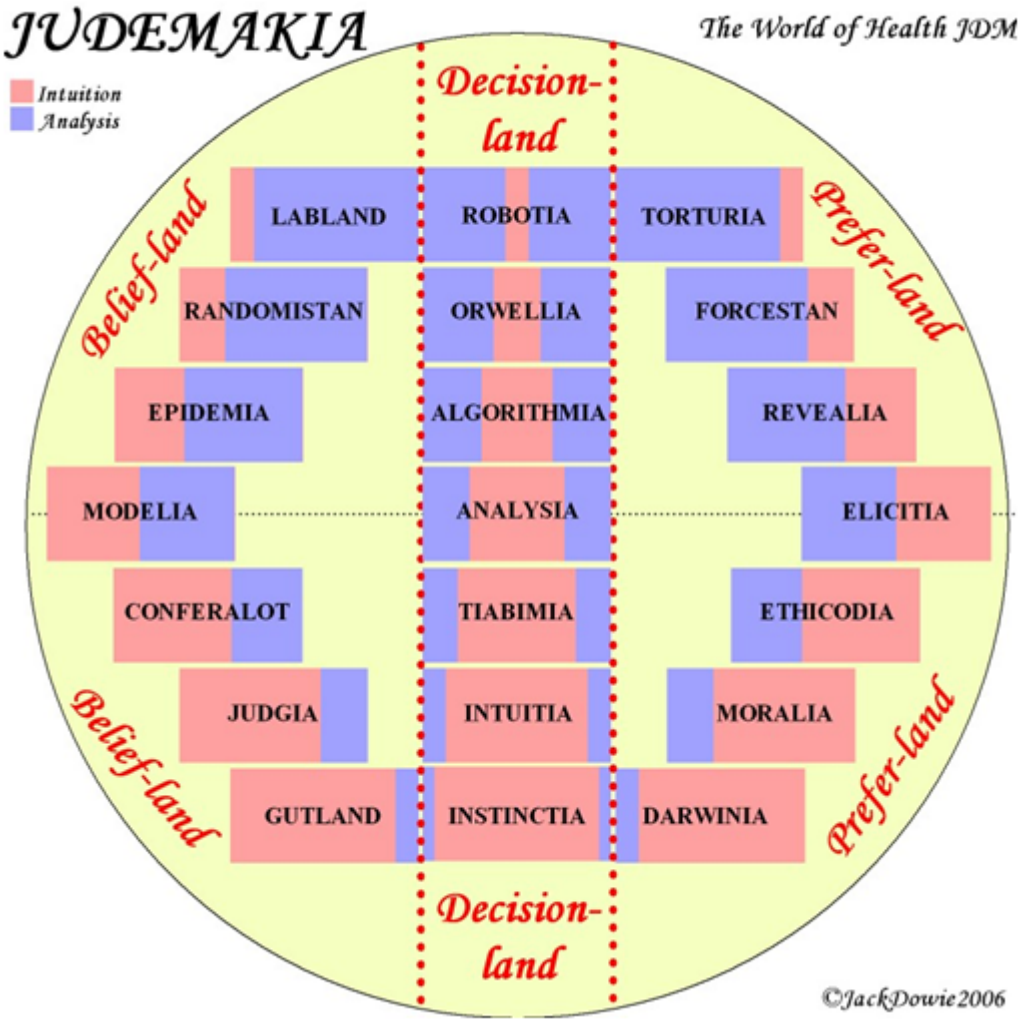
A further problem, is that it is likely that many categories of previous evidence are not considered nor are many specific meta or individual analyses of studies within each category. Publication bias is a major factor, as it largely determines the total evidence that is available in the first place. As well as often only publishing positive results, after a period of tending

[13] note that *intuition* can be thought of as analogous to 'System 1' thinking, and *analysis* analogous to 'System 2' thinking as described by Kahneman (2011n) (see above).

[14] especially difficult in the context of complicated interventions such as the women's groups

[15] for a discussion of some of the difficulties see §2.1, §2.2.4, §4.3, §5.4, §5.5.2, §6.6 and §7.5 in particular.

Figure 8.1: JUDEMAKIA: a map of JUdgement and DEcision-MAKing in health



Reprinted with permission from Jack Dowie. Each box in the figure (country on the map) represents a category of belief, decision or preference technology; the categories are modes of cognition and practice, often reinforced by the separation of academic disciplines. In JUDEMAKIA the continent of Decision-land contains countries representing methods of decision-making ranging from those determined almost exclusively by instinct (INSTINCTIA, inhabited by people such as addicts) to those determined almost exclusively by analysis (ROBOTIA, inhabited by beings such as frankenstein, or to use a previously used example, Thaler's *Econs* - see page 130). All decisions are informed by, and dependent on, the beliefs (evidence, knowledge) of Belief-land and the preferences (values) of Prefer-land, the countries (categories) of which are each arranged in equivalent order of analysis to intuition ratio as the categories of decision-making in Decision-land. The decision of whether to adopt a new intervention often takes place in TIABIMIA (Taking Into Account, Bearing In Mind), informed by evidence from all countries of Belief-land. Some, such as that from RANDOMISTAN or JUDGIA, often (implicitly) weighted more highly than others. The emissaries of Prefer-land, and especially those of the northern analysis-dominated countries, are usually less-welcome contributors to the decision. Some intervention adoption decisions, such as those primarily based on QALY maximisation in the UK (see §8.5), take place on the other side of the quantitative-qualitative explicit-implicit border conflict area, in ANALYSIA, and give more weight to evidence from MODELIA in Belief-land and ELICITIA (e.g. utility weights for QALYs) in Prefer-land. The increasing distance between the continents closer to the equator denote the increase in uncertainty of both analysis and intuition as the ratio between them becomes more equal; make communication between the continents at these latitudes more difficult, and consequently make people less comfortable with the belief, decision and preference technologies of these latitudes. Information and Communication Technologies such as Annalisa (see main text) aim to bridge these distances by explicitly and transparently synthesising evidence from all countries of Belief-land to score values synthesised from all countries (except TORTURIA!) of Prefer-land. See Dowie (2009); Dowie and Kaltoft (2012); Dowie (2012) for further details and discussion.

to favour the publication of confirmatory results, scientific journals can tend to favour only publishing research refuting the original positive results; the cumulative effect of such editorial policies being a worrying distortion of the totality of all evidence on that subject, termed the 'decline effect' (Lehrer, 2010). In recent times there has been an increase in the awareness of such publication biases, manifest, for example, by an increase in journals specialising in the publication of negative results.[16] However, secondary research is still subject to significant historical, as well as current, publication bias.

In summary, there are multiple limitations to the measurement systems that important decisions in health policy are based on. Which values are considered in the first place, how they are scored for each intervention and weighted with respect to each other, are all influenced by a variety of factors influencing individuals and groups of respondents, interviewers, researchers and decision-makers, each in a variety of ways. In the face of such complexity, I attempt to outline a way forward in the following section.

8.7 Concluding thoughts and way forward

This final section starts with a summary of the methodological and empirical contributions made in this thesis, before concluding with thoughts on potential future applications and recommendations for further research in relation to these contributions. The on-going debates related to economic evaluation of interventions, allocative efficiency and health and social policy are also discussed.

The main methodological contributions of the work undertaken in this thesis were to translate the WHOQoL-BREF for future use in Malawi, and to develop and test discrete choice experiments for preference-weighting of quality of life attributes and contingent valuation to assess local women's willingness-to-pay for an intervention. I hope the Chichewa WHOQoL-BREF will be useful to others in future efforts to evaluate quality of life in Malawi in order to assess health states, health and development interventions and wider interventions in the public sphere. The pilot and main DCE and CV studies were probably the first of their kind undertaken in rural Malawi, and the learning gained from their use with respondents in this context should be useful to others hoping to use similar methods in similar populations. The novel use of different and perhaps more locally appropriate payment vehicles in the CV study should also be of interest to other researchers.

The main empirical contributions of this doctorate were characterisation of the quality of life of a variety of groups of Malawians, estimation of how rural Malawian women weight different areas of quality of life with respect to each other, and how they value the women's group intervention in monetary terms. Quality of life was described for: ill men and women with a variety of health complaints in a central urban hospital; their carers, healthy men and women in the district (all from the pilot WHOQoL-BREF study); and women in the women's groups, non-members in the same village and women in other (control) villages (from the main WHOQoL-BREF study). Nearly all of the women, regardless of whether they were members of

[16] see e.g. *Journal of Negative Results in Biomedicine* (started 2002), *Journal of Negative Results* (first published 2004) *Journal of Pharmaceutical Negative Results* (first published 2010)

the women's groups or not, were willing-to-pay for the continuation of the groups when faced with the possibility that they might be discontinued due to real funding cuts, justifying their responses with a variety of reasons including those related to direct, indirect, health and non-health benefits of the groups, for them, and for others. Limitations of the methods used, and especially the DCE, were extensively discussed, and a variety of theoretical considerations were also reviewed, including those related to economic evaluation, allocative efficiency and their application to health, social and general public policy decision-making. My concluding thoughts follow in this vein.

Overall, a pluralist approach to determining values, measurement and decision-making in economic evaluation and health and social policy seems wise. Consideration of multiple values from multiple perspectives in a form of political liberalism, or overlapping consensus (Rawls, 1986; Wolff and De-Shalit, 2007; Nussbaum, 2011) with similar broad aims seems a sensible ideal if the goal is to maximise satisfaction with the evaluation and policy process as well as the outcomes. Obviously, deciding on the 'similar broad aims', which will both inform and be informed by the chosen values, will require a lot of work to overcome differences in personal politics (§2.1.7).[17] Perhaps a process of 'public reflective equilibrium', advocated by Wolff and De-Shalit (2007) and involving iterative discussions with relevant stakeholders (members of the public, researchers, decision-makers etc.), would help in this regard. The perspectives of the people consulted in such an exercise will obviously determine what values are included in any evaluation. Local forms of knowledge and preferences should influence what is valued in any priority setting exercise (§8.5), and in the case of Malawi, and other donor-dependent settings, the perspectives of the donors as well as local beneficiaries and policymakers are obviously also important. Relevant values could be inline with the notions of social contractism (§2.1.7), equality of primary goods (§2.1.4), central capabilities (§2.1.5), and other perspectives on quality of life and well-being (§2.1), or otherwise. Consideration of both means (processes) and ends (outcomes) is likely to be important (§8.4) as is, perhaps, consideration of both the experiencing self and the remembering self (§8.6). The final evaluative space chosen will obviously depend on how expert-driven or public-driven such a process ends up.

[17] As an interesting and relevant aside here, it is interesting to note that the rational-agent model of economics, rejected in this thesis (§5.4) is seen by some (e.g. Kahneman, 2011n, p.411-415) as justification for neoliberalism, the political belief in pure market capitalism, with minimal government involvement, being the optimal form of human organisation because markets are always fair and efficient and given people are always free to choose, and are rational utility maximisers, everything will be fine (see e.g. Friedman (1990), other works by Milton Friedman and other economists of the neoliberal 'Chicago school'). Behavioural economists, on the other hand, because they reject the rational-agent (*Econs*, see page 130) model, advocate some amount of government control to look out for people, prevent them making the wrong choices (which according to the rational model can't be made), and help them out after wrong choices are made. Obviously, following the disasters of the twentieth century (including manifestations of fascism in Europe and communism in Russia, Central Asia and China) the key problem is how much freedom should be curtailed. Recently *Thaler and Sunstein (2008)*, in their book *Nudge,* have advocated 'liberal paternalism': nudging people to make decisions that are best for them in the long-term, and example of which is setting the default option i.e. making people opt-out rather than opt-in to things that are good for them/society such as organ donation. However, the 'paternalism' aspect is of concern and there could alternatively be a focus on teaching people judgement and decision-making, so that they are better able to protect themselves from the preying tactics of 'choice architects'; and understand the consequences of their actions. Personally, I favour a form a 'no gods, no masters' anarchist bottom-up horizontal human organisation for mutual gain (from each according to their ability to each according to their need). However, I realise (with despair) that as a whole, people are generally too narrow-minded and short-sighted in their world view to make such a goal even remotely possible. My fall-back position is therefore a form of government-facilitated egalitarianism concerned with promoting human capabilities and well-being (§2.1.7).

Single-reason or single-value monist alternatives do not make sense, especially considering that even single goals such as 'maximise health' actually consist of a range of smaller goals (Orr et al., 2011) -in this case addressing different health issues in different population groups in different places at different times. The nature of resource scarcity[18] means that giving health to one person necessarily means withholding it from another[19], so the question of 'maximising health' has to be qualified by: for who? and when? each of which need to be clarified by: why? To further complicate things, each sub-goal is affected by different factors both within, and also importantly outside of, the remit of the health sector. Each sub-goal is affected by complex interactions between interventions (aimed at achieving the sub-goal or achieving some other sub-goal or goal), risk factors and context. This complexity highlights the need for inter-sectoral dialogue in decision-making, introduced at the end of §1. Perhaps, as some like Orr et al. (2010), and others before them (e.g. Buxton, 2007) have suggested, there is the need for a cross-sectoral 'super-QALY', which could be partly informed by measuring quality of life from a very broad 'multi-sectoral' perspective by instruments like the WHOQoL-BREF (§2.2-2.3). Alternatively, generalised cross-sectoral cost-benefit analyses, which avoid intermediary multi-dimensional quality of life measurement (Buxton, 2007), but require direct monetary contingent valuation of all benefits - rejected by some sectors including, importantly, the health sector (Orr et al., 2010) - , could be pursued. Ensuring equal valuation of human life across government departments (Sunstein, 2004; Wolff and Orr, 2009) should ideally also be pursued.

If there is no single metric then frameworks for combining different methods of measurement are required. Such frameworks each have their strengths and weaknesses, and it is likely that there is no one-size-fits-all framework (§8.2, §8.6) with differing contexts necessarily requiring different interventions. These in turn may require different means of measurement, assessment and evaluative decision-making. As such, a pluralistic approach to measurement may also be beneficial, especially so if it encourages greater buy-in from intended beneficiaries because it is more politically representative (Walzer, 1984; Miller and Walzer, 1995; Miller, 2001). Nevertheless, there is the need for consistency in methods of evaluation. A promising meta-framework for combining the measurement of multiple values is Multi Criteria Decision Analysis. Certain manifestations of MCDA, such as the Annalisa tool (Cunich et al., 2011) (§8.6), which is easy to use, low-cost in both time and monetary terms, perhaps accurate enough, and is applicable to decision-making at a variety of levels of the health system and elsewhere, are perhaps more useful in the real world than others. How to quantify the values chosen to inform any MCDA is difficult though, and perhaps the major limitation of the approach. The alternative of more intuitive reasoning[20] is less attractive, however, meaning that methods of measurement should

[18] In the advent of a technological 'singularity' following breakthroughs in artificial intelligence (see http://singinst.org/singularityfaq for further information and references) this may not be an issue in the future. However, the possibility of such 'post-scarcity' economies are beyond the remit of this thesis.

Looking to the future, there are also a multitude of other concerns with respect to possibilities of enhancing humans through biotechnology and genetic engineering, and human augmentation through computers. Some state that given that it will be possible to eradicate the biological substrates of suffering through redesigning the vertebrate genome, it will be ethically imperative to do so (see *The Hedonistic Imperative* by David Pearce, available at http://www.hedweb.com). Such considerations however are obviously also beyond the scope of my thesis.

[19] see discussion on allocative efficiency in §8.5

[20] other alternatives to MCDA still require quantitative data and are hence also beset with the same problems

continue to be developed. In this thesis, I have explored methods of measuring quality of life (§2.2, §3, §4), and weighting different areas of quality of life (§5, §6) as proxy measures of the value (benefit) of a community-based health and development intervention; and, contingent valuation (§7) to attempt to value the intervention holistically from the perspective of local beneficiaries. All these measures have their own strengths and weaknesses (§8.4) and require further research to improve them. A multidisciplinary approach, considering philosophy and politics (ethics, morality, political liberalism and overlapping consensus), limitations of measurement (psychology of judgement and decision-making, anthropology of interviewees, interviewers and researchers), economics (preferences and willingness-to-pay of welfare economics and the extra-welfarist capability approach), justice (legality, precedents, discrimination) as well as processes and outcomes related to individual and community quality of life and health, is likely to lead to more considered reasoning in economic evaluation and consequent health and social policy.

related to measurement

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Appendix A

Training Summary

The following four pages reproduce the training summary from my UCL research student log, including attendance of courses and conferences, fieldwork, grant applications, and writing and reviewing papers.[1]

[1] UCL requires all students to log at least 60 points over the course of their Ph.D. studies.

{research student log}

View: Default | Larger Text | Printer Friendly | High Contrast

email: researchlog@ucl.ac.uk

Training Summary

Total points: 101

My Upcoming Courses

Course	Points	Date/Time

Courses Logged

Course	Points	Attended	
Conference - Paper Preparation Prepared and gave presentation on the results of the MaiKhanda randomised controlled trial at the IHI/BMJ International Forum on Quality and Safety in Health care, Paris, 17-20th April 2012.	2	2012-04-19	[delete]
Conference - Attendance Attended IHI/BMJ International Forum on Quality and Safety in Health care, Paris, 17-20th April 2012.	2	2012-04-17	[delete]
Writing a Paper for submission to a Journal - Per Paper Lead author on high profile cluster randomised controlled trial of quality improvement and health centres and community mobilisation through women's groups in Malawi. Submitted to PLoS Medicine.	4	2012-04-02	[delete]
Conference - Poster Preparation Created poster of MaiKhanda Randomised Controlled Trial results for IHI/BMJ International Forum on Quality and Safety in Health care, Paris, 17-20th April 2012.	2	2012-03-30	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for PLoS Medicine on direct and indirect estimates of under-5 mortality	2	2012-03-19	[delete]
Writing a Paper for submission to a Journal - Per Paper Lead author on development and validation study of WHOQoL-BREF for use in Malawi. Re-submitted to BMC Research Notes after corrections following review.	4	2012-02-10	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for Quality of Life Research on changes in quality of life in Catalonia from 1994 to 2002	2	2012-01-14	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for PLoS Medinice comparing the under-5 mortality estimates for of the UN and IHME.	2	2012-01-06	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for FACTS Reports on family health interventions in Niger	2	2011-09-24	[delete]
Significant Contribution to the Writing of Research Grant Applications (per Grant) Contributed to a successful grant application to the Bill and Melinda Gates Foundation on studying the effect of the new pnuemonia vaccine (PCV13) on the health system in Malawi	1	2011-09-15	[delete]
UK GRADschool Residential Courses UK GRADschool 3 Day	6	2011-08-08	[delete]

Course - 2010/11
Once you have completed your training, please log your points here.

UCL Personal & Professional Management Skills 3-day residential course at Oxon Hoath

Conference - Paper Preparation Prepared paper on how women's groups aimed at improving maternal and neonatal health in malawi also improve general quality of life which I then presented as part of a group session on capabilities and empowerment at the IHEA 2011 conference in Toronto	2	2011-07-11	[delete]
Conference - Paper Presentation Presented a paper on how women's groups aimed at improving maternal and neonatal health in Malawi also improve quality of life of their members; as part of an organised session on capabilities and empowerment at the 8th IHEA world congress in Toronto, Canada in July 2011	1	2011-07-11	[delete]
Conference - Attendance International Health Economics Association 8th World Congress, Sheraton Centre, Toronto, Canada, 10-13th July 2011	2	2011-07-10	[delete]
Research Student Careers Training Session Interview Skills workshop at UCL Careers service	1	2011-07-05	[delete]
Introduction to R for Statistical Analysis	2	2011-06-22	[delete]
Writing a Paper for submission to a Journal - Per Paper Co-authored paper on intra-cluster correlation co-efficients for perinatal outcomes, published in Trials in June 2011	4	2011-06-14	[delete]
Research Student Careers Training Session Academic Applications workshop session at UCL Careers service	1	2011-06-03	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for Population Health Metrics on verbal autopsy	2	2011-04-27	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for PLoS Medicine on neonatal mortality estimates for 193 countries	2	2011-03-15	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper on MMR estimates for 181 countries for the Lancet	2	2010-03-19	[delete]
Significant Contribution to the Writing of Research Grant Applications (per Grant) Contributed to a successful grant application to the EU FP7 call. I am funded 20% on the project called MOMI: Missed Opportunities in Maternal and Infant health	1	2010-01-14	[delete]
Attending International Training Workshop - Per 1/2 Day Discrete Choice Modelling, 13th-15th January 2010. Run by the UCL Economics Department, Institute of Fiscal Studies (IFS) and centre for microdata methods and practice cemmap	1	2010-01-13	[delete]
Peer Reviewing a Paper for a Journal Reviewed a paper for the British	2	2010-01-12	[delete]

Journal of Obstetrics and Gynaecology

- **Conference - Attendance** 2 2010-01-06 [delete]

  Health Economics Study Group, winter meeting January 6th-8th 2010 at LSE

- **Fieldwork - 6-12 Months** 20 2009-12-01 [delete]
  PhD fieldwork in Malawi
- **Submitting an Application to an Ethics Committee for Review (per application)** 1 2009-11-04 [delete]

  Submitted application to National Health Sciences Research Committee (NHSRC) of Malawi for ethical approval of PhD fieldwork in Malawi

- **Writing a Paper for submission to a Journal - Per Paper** 4 2009-09-23 [delete]

  Co-authored a paper on modelling effect of interventions for sepsis and heamorrhage in Africa on maternal mortality, published in the Lancet in September 2009

- **Submitting an Application to an Ethics Committee for Review (per application)** 1 2009-07-31 [delete]

  Submitted application for PhD research to UCL ethics committe

- **Conference - Attendance** 2 2009-07-22 [delete]

  Health Economics Study Group,

  University of Sheffield

- **Conference - Attendance** 2 2009-06-22 [delete]

  - ***The Bigger Picture: Navigating the Research World (Conference for Research Staff and Research Students)***

  UCL is organising a major 1-day conference in June looking at *Navigating the Research World: the Bigger Picture.*

  The conference is aimed at early career researchers - primarily research staff but also research students in their final year. The day will be useful for all early career researchers in maximising the effectiveness of current research and also thinking about future careers.

  Speakers include UCL's Provost and Vice-Provost for Research, as well as interesting figures from the Research world such as Professor the Baroness Greenfield, Director of the Royal Institution. Topics covered include: the increasing importance of public engagement in research; be a better researcher – connect with business; managing research relationships; wellbeing and research; how to achieve research success at UCL and beyond.

  The day includes presentations, interactive sessions and a panel debate. Refreshments are provided during the day, and the event ends with a drinks reception and prize draw.

- **Statistical Analysis Methods for Epidemiology and Social Sciences** Introduction to Multilevel Models Summer 2008/09
  This course will take place in 2 parts:
  Lecture, 10am - 12pm,
  Followed by a practical cluster session, 2pm - 4pm
  2 2009-06-11 @ 10:00:00 [delete]
- **Presentation Skills Workshops** June 2009 - Workshop 3
  This Course consists of 2 sessions:
  1) Lunchtime Presentation
  2) Afternoon Workshop
  Both sessions should be attended.
  2 2009-05-27 @ 13:00:00 [delete]
- **Statistical Analysis Methods for** 8 2009-05- [delete]

	Epidemiology and Social Sciences Components, Factor, Path Analyses and Structural Equation Models Summer 2008/09 This module comprises four compulsory workshops; 1. Principal components analysis and Factor Analysis 1 2. Principal components analysis and Factor Analysis 2 3. Path Analysis 4. Structural Equation Models		14 @ 10:00:00	
	Sample Size Estimation and Power Calculations	1	2009-05-12	[delete]
	Statistical Analysis Methods for Epidemiology and Social Sciences Analysing Complex Survey Data Summer 2008/09 This course will take place in 2 parts: Lecture, 10am - 12pm, Followed by a practical cluster session, 2pm - 4pm	2	2009-05-07 @ 10:00:00	[delete]
	Conference - Attendance Advanced Methods of Cost-Effectiveness Analysis, 10-12 December 2008, Health Economic Research Centre, Oxford University	2	2008-12-08	[delete]

Appendix B

Ethical Approval

The following pages contain letters of ethical approval from the National Health Sciences Research Council (NHSRC) of Malawi (Protocol #696), and UCL (Project ID: 2105/001). All respondents gave informed consent prior to being included in the study (see Appendix C below for information sheets and informed consent forms).

Telephone: + 265 789 400
Facsimile: + 265 789 431
e-mail doccentre@malawi.net
All Communications should be addressed to:
The Secretary for Health and Population

In reply please quote No. MED/4/36c
MINISTRY OF HEALTH
P.O. BOX 30377
LILONGWE 3
MALAWI

10th February, 2010

Tim Colbourn
UCL, Centre for International Health and Development

RE: **Protocol #696**: Investigation of the benefits of women's groups in Malawi via quality of life measurement and discrete choice experiments

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for review. Please be advised that the NHSRC has **reviewed** and **approved** the above titled study.

- **APPROVAL NUMBER** :**NHSRC/696**
  The above details should be used on all correspondence, consent forms and documents as appropriate.
- **APPROVAL DATE** : **10th February 2010**
- **EXPIRATION DATE** :This approval expires on 9th **February 2011**
  After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC secretariat should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING** :All serious problems having to do with subject safety must be reported to the National Health Sciences Research Committee within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **MODIFICATIONS**: Prior NHSRC approval using standard forms obtainable from the NHSRC Secretariat is required before implementing any changes in the Protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on Telephone No. (01) 789314, 08588957 or by e-mail on doccentre@malawi.net
- **Other:**
  Please be reminded to send in copies of your final research results for our records as well as for the Health Research Database.

Kind regards from the NHSRC Secretariat.

.....
FOR CHAIRMAN, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE

UCL RESEARCH ETHICS COMMITTEE
GRADUATE SCHOOL OFFICE

Dr Jolene Skordis-Worrall
Centre for International Health and Development
3rd Floor, UCL Institute of Child Health
30 Guilford Street
London
WC1N 1EH

22nd September 2009

Dear Dr Skordis-Worrall

Notification of Ethical Approval for Ethics Application:
Project ID: 2105/001: Investigation of the Benefits of Women's Groups in Malawi via Quality of Life Measurement and Discrete Choice Experiments

I am pleased to confirm that in my capacity as Chair of the UCL Research Ethics Committee I have approved the above study for the duration of the project i.e. until February 2011.

Approval is subject to the following conditions:

1. You must seek Chair's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to these projects and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form'.

The form identified above can be accessed by logging on to the ethics website homepage: http://www.grad.ucl.ac.uk/ethics/ and clicking on the button marked 'Key Responsibilities of the Researcher Following Approval'.

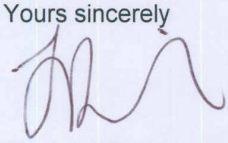
2. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. Both non-serious and serious adverse events must be reported.

Reporting Non-Serious Adverse Events.
For non-serious adverse events you will need to inform Ms Helen Dougal, Ethics Committee Administrator (h.dougal@ucl.ac.uk), within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair of the Ethics Committee will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Reporting Serious Adverse Events
The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.

On completion of the research you must submit a brief report (a maximum of two sides of A4) of your findings/concluding comments to the Committee, which includes in particular issues relating to the ethical implications of the research.

Yours sincerely



Sir John Birch
Chair of the UCL Research Ethics Committee

Cc: Timothy Colbourn, Centre for International Health and Development, UCL
Dr Shepley Orr, Centre for Transport Studies, UCL

UCL Research Ethics Committee, c/o The Graduate School, North Cloisters, Wilkins Building
University College London Gower Street London WC1E 6BT
Tel: +44 (0)20 7679 7844 Fax: +44 (0)20 7679 7043
h.dougal@ucl.ac.uk
www.ucl.ac.uk/gradschool

Appendix C

Information sheets and Consent forms

Reproduced on the following pages are, in order, the:

Information and Consent form for the Focus Group Discussions in English, and then Chichewa[1]

Information sheet for the pilot WHOQoL-BREF study in English and then Chichewa

Information sheet for the pilot BWS-DCE study in English, and then Chichewa

Information sheet for the pilot CV study in English[2]

Information sheet for the combined final QoL, BWS and CV studies, in English, and then Chichewa

The consent form used for the pilot BWS-DCE study that involved tape recording, in English, and then Chichewa

The consent form used for the WHOQoL-BREF and CV pilot studies and the final combined QoL, BWS and CV studies, in English, and then Chichewa

[1] Please note that the differences in the numbers of 'Yes' 'No' tick-boxes on the two forms are due to the Chichewa version having boxes for the participants to indicate that they understand the information contained in the bullet points of the English version.

[2] I have not included the Chichewa translation of this form as I can't find it. The only difference to the information sheet for the pilot BWS-DCE study, however (as seen by comparing the English versions), is in the first two paragraphs under 'Insert details of the study'.

CONSENT FORM-WG FGD

District		FGD Facilitator	
WG(s)		Designation	M&E Officer
Organization	MaiKhanda		

Hello, I am ……. working as a MEO with MaiKhanda based in…….district office.

As you are aware MaiKhanda has the aim of reducing maternal and neonatal mortality in Malawi. In order to work towards this goal one of our project objectives is to understand how we can improve and scale up our community Women's Groups. We are conducting this Focus Group to gain knowledge of your experiences as a woman's group member so that we can have such an understanding of how we can improve the programme. By agreeing to take part in this focus group you will help us learn from the current women's group intervention so that the implementation of women's groups in other communities in Malawi can be improved in future.

We would appreciate if you provide us with accurate and honest information, as this will facilitate us to have a better understanding of the women's groups.

- There are no wrong answers, anything you say is important.
- We will maintain complete confidentiality regarding your identity.
- You do not have to answer any question that you don't want to answer
- All information provided by you will be used for evaluation purposes only.

If you agree to participate in the focus group, could you please provide us with your written consent:

Name		Signature	
Place		Date	

- Consent for tape recording focus group:
  We would like to remember all the important things that you say, so we would like to record the focus group. The
  recording will be kept confidential and will not be shared with anyone apart from MaiKhanda M+E staff. Is it OK for me to record the focus group?

Yes	
No	

  - If there are any issues with recording, may I take notes?

Yes	
No	

CONSENT FORM-WG FGD

District		FGD Facilitator	
WG(s)		Designation	M&E Officer
Organization	MaiKhanda		

Zikomo nonse choyamba ndikulandireni komanso kukuthokozani chifukwa chakubwera kwanu.
Ine dzina langa ndi …… ndimagwira ntchito ndi bungwe la MaiKhanda kuchokera mboma la …….
Ena mwa inu mukulidziwa kale bungweli. Bugweli la MaiKhanda likuyesetsa kuchepetsa imfa za amai ndi wana mdziko lino la Malawi. Pofuna kukwanilitsa cholinga chimenechi, imodzi mwa tchito imene bungweli likugwira ndi kuyesetsa kumvetsa mmene lingatukulire ndi kukulitsa magulu a amayi mudzi mwathu muno.
Ticheza nanu pa gulu la amayi kuti tiphunzire kuchokera kwa inu mmene miyoyo yanu ikuyendera ngati amayi ndi cholinga choti tindiwe mmene tingatukulire ntchito zathu.

Kuvomereza kwanu kutengapo gawo mu zokambiranazi, zithandiza bungweli kuphunzira mmene mukuchitira kuti anzathu ena mmadera kapena mmidzi yina ya mMalawi muno kuti nawonso athe kukhazikitsa magulu awo mosavuta.
Tikhala okondwa ndi oyamika kwambiri ngati mutatiwuze zowona zokhazokha ndi tsatanetsatane wa mmene zithu zikuyendera, pozindikira kuti pakutero mutithandiza kumvetsa magulu a amayi.

Dziwani kuti:

- Palibe yankho lolakwika ndipo zonse zimene mutatiwuze ndizofunikira
- Zonse zimene tikambirane pano ziri pakati pa inu ndi ine. Ndipo zidzagwiritsidwa ntchito pa kafukufuku
- Simuli okakamizidwa, komanso muli ndi ufulu kusiya kukambiranaku (interviyu) nthawi yina iliyonse, ngakhale kuti tinayamba kale.

Ngati muli omasuka kutengapo gawo mu kukambiranaku, mukupemphedwa kuti muwonetse kuvomere kwanu pakusayina

Ndawerenga ndi kumvetsetsa zomwe zalembedwazi zokhuza kafukufuku uyu wa mwezi wa June 2009 ndipo ndinali ndi mwayi wofunsa mafunso.	Yes ☐ No ☐
Ndamvesetsa ndi kudziwa kuti kutengapo mbali pa kafukufukuyu sikokakamizidwa ndipo ndili ndi ufulu wosiya kutengapo mbali nthawi ina iliyonse popanda kupereka chifukwa china chilichonse.	Yes ☐ No ☐
Ndikuvomereza kuti zokambirana zathu zilizonse zitha kujambulidwa komanso kulembedwa	Yes ☐ No ☐
Ndamvetsa kuti zokambirana zathu zonse zizasungidwa bwino komanso mwachinsisi.	Yes ☐ No ☐
Ndagwirizana nazo zoti tikambirane komanso kujambulidwa ngati zinthu izi zizasungidwa mwachinsisi.	Yes ☐ No ☐
Ndavomera kutengapo mbali mukafukufukuyu.	Yes ☐ No ☐

Respondent's name	Signature (or thumb print)	Date
Researcher's name	Signature	Date

Information sheet for Quality of Life measurement (WHOQoL-BREF):

Information Sheet for Participants in Research Studies
(*define target group i.e. Parent/Guardian/Child/Teacher*)

You will be given a copy of this information sheet.

Title of Project in lay terms: **Piloting a questionnaire to measure Quality of Life**

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: **2105/001**
And the National Health Sciences Research Council of Malawi Ministry of Health [Approval Number]: **NHSRC/696**

Name, Work Address and Contact Details of the Principal Researcher

Timothy Colbourn
Parent and Child Health Initiative (PACHI)
Amina House
Paul Kagame Road roundabout
P.O. Box 31686
Lilongwe 3
+265 888 159 231
t.colbourn@ich.ucl.ac.uk

We would like to invite ……You……. to participate in this research project.
You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Insert Details of Study:
This research aims to validate a questionnaire designed by the World Health Organisation to measure Quality of Life. The WHOQoL-BREF questionnaire (WHO Quality of Life questionnaire, shortened version) aims to measure quality of life by asking 26 questions about a range of aspects of your life. The questionnaire has recently been translated into Chichewa for use in Malawi and this study will help the WHO determine how it measures Quality of Life in Malawi. We would also like to ask you 15 questions on any disabilities you or members of your household may have. This study will also provide useful information regarding people's Quality of Life in Malawi and how it relates to disability, both for people who are healthy and people who are in hospital or have recently been in hospital. We are inviting people like you to take part in the study

If you agree to take part the questionnaire will take 30 minutes to one hour of your time and can be done right here so you don't need to go anywhere.

There may be some questions that you don't want to answer. This is completely fine – you don't have to answer any questions you don't want to and you are free to drop out of the study at any time.

We think it is important that people like you get to express their views on their quality of life.

If you agree to take part in the study your name will not be recorded so that it will not be possible to trace back any of the information to you. The anonymous information we will record will only be accessed by the fieldworker who conducts the study and a limited number of researchers in Lilongwe and London.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Submission of a completed questionnaire implies consent to participate.

As participation is anonymous it will not be possible for us to withdraw your data once you have returned your questionnaire.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Mndandanda wa mfundo za kuyeza umoyo wabwino (WHOQoL-BREF):

Mndandanda wa mfundo wa.....Anthu Otenga Mbali ..... pa kafukufuku
(Tchulani omwe mukucheza nawo: makolo/ mwana/ a phunzitsi.)
Mupatsidwa mndandanda/ tsatanetsatane wa mfundozi

Dzina la polojekiti	Kuyesa mndandanda wa mafunso wokhuzana ndi kuyesa umoyo wabwino
Kafukufukuyi wavomerezedwa ndi a bungwe la UCL [Project ID Number]:	2105/001
Mogwirizana ndi a National Health Science Research Council of Malawi a mu unduna wa zaumoyo:	NSHRC/696

Dzina, Keyala ya kuntchito ndi keyala ya mkulu wa kafukufuku

Timothy Colbourn
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Amina House
Paul Kagame Road roundabout
P.O. Box 31686
Lilongwe 3
+265 888 159 231
t.colbourn@ich.ucl.ac.uk

Ndikukuitanani inu a ……Inuyo……..kuti mutengepo gawo mu kafukufuku.
(Inuyo kapena mwana wanu)
Koma mukudziwitsidwa kuti mutha kutengapo gawo mu kafukufukuyi ngati mukufuna. Kusankha kusatengapo gawo mu kafukufukuyi sikubweretsa vuto lirilonse kwa inu. Musanaganize kutengapo gawo kapena ayi ndi chinthu chofunikira kwambiri kuti muwerenge mndandanda wa mfundozi bwino ndikuzimvetsa, komanso mutha kukambirana ndi anzanu ngati mukufuna. Mutha kutifunsa ngati simukumvetsa chilichonse kapena ngati mukufuna mfundo zina.

Tsatanetsatane wa kafukufuku

Cholinga cha kafukufukuyi ndi kufuna kudziwa kuvomerezeka kwake kwa mndandanda wa kafukufuku amene anakonzedwa ndi bungwe la za umoyo pa dziko lonse lapansi la WHO pofuna kuyesa umoyo wapamwamba kapena wabwino. Mndandanda umenewu cholinga chake ndikuyeza umoyo wa pamwamba/ wabwino pofunsa mafunso 26 okhuzana ndi magawo ambiri a moyo wanu. Mndandanda wa mafunsowa watanthauziridwa mchichewa kuti uthe kugwiritsidwa kapena kutsatidwa mMalawi muno. Ndipo kafukufukuyi athandiza bungwe la WHO kudziwa mmene angayesere umoyo wa pamwamba mMalawi muno. Tikufunsaniso mafunso ena 15 okhuzana ndi kulumara kwa mtundu uliwonse kumene inuyo kapena aliyense wa m'banja mwanu angathe kukhala nako. Kafukufukuyi athandizanso kudziwa mmene umoyo wa bwino uliri mMalawi muno komanso mogwirizana ndi kulumara; kwa anthu amene ali athanzi ndipo sakudwala, komanso anthu amene ali mchipatala kapena anali mchipatala posachedwapa. Tikupempha anthu ngati inuyo kuti mutengepo gawo mu kafukufukuyi.

Ngati mukuvomereza kuti ticheze nanu, kucheza kwathu kutenga pafupifupi theka la ola limodzi kufikira ola limodzi (30 minutes to 1 hour) ndipo titha kuchezera pompano ngati muli omasuka.
Patha kupezeka mafunso ena amene simungathe kuyankha, dziwani kuti simukuyenera kuyankha funso iliyonse limene inuyo simukufuna, komanso muli omasuka kusiya kutengapo gawo mu kafukufukuyi nthawi liriyonse.
Tikuwona kuti ndi chinthu chofunika kuti anthu ngati inuyo muzikhala omasuka kunenapo maganizo anu pa za umoyo wanu.
Ngati muvomere kutengapo gawo, dzina lanu sililembedwa kuti palibe amene angathe kukupezani potsatira mfundo zimene munapereka.
Nkhani zimene titalembe pakucheza nanu, zikhala ndi alangizi amene akuyendetsa kafufukuyi kuno komanso ndi anthu ochepa amene akonza kafukufukuyi ku Lilongwe ndi ku Mangalande.
Ngati musankhe kutengapo gawo, tsatanetsatane wa mfundozi mupatsidwa kuti musunge ndi kusaina pepala yotsimikiza chisankho chanu. Mukatsiriza kuyankha mafunso onse ndi kupereka, zikutanthauza kuti mwavomereza kutengapo gawo.
Pozindikira kuti kutengapo gawokwanu ndi kwa chinsinsi, dziwani kuti pakhala povuta kuchotsa mfundo kapena maganizo anu mu kafukufuku pamene mwasiya kutengapo gawo.
Zili kwa inu kutenga nawo mbali kapena ayi. Ngati mutavomere kutenga gawo mukafukufukuyi, dziwani kuti mutha kusiya nthawi iliyonse angakhale posapereka chifukwa.

Mfundo zonse zomwe titenge kuchokera kwa inu zisungidwa potsatira malamulo oteteza mfundozi amene anakhazikitsidwa mchaka cha 1998

Information sheet for Best-Worst Pilot:

Information Sheet for ……Participants…… in Research Studies

You will be given a copy of this information sheet.

Title of Project in lay terms: **What are MaiKhanda Women's Groups worth to Malawian Women?**

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: **2105/001**

Name, Work Address and Contact Details of the Principal Researcher

Timothy Colbourn
Parent and Child Health Initiative (PACHI)
Amina House
Paul Kagame Road roundabout
P.O. Box 31686
Lilongwe 3
+265 888 159 231
t.colbourn@ich.ucl.ac.uk

We would like to invite ……You……. to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Insert Details of Study:

This research aims to determine how women value different areas of quality of life that might be affected by the MaiKhanda Women's Group intervention.

We are inviting women to complete tasks whereby they have to make choices as to which areas of quality of life they value more. The specific details of the choice tasks will be explained in detail before you take part if you agree to do so.

If you agree to take part the task will take about 30 minutes of your time and will be done right here in your village so you don't need to go anywhere.

There may be some questions that you don't want to answer. This is completely fine – you don't have to answer any questions you don't want to and you are free to drop out of the study at any time.

We think it is important that women like you get to express their preferences for different areas of quality of life.

If you agree to take part in the study your name will not be recorded so that it will not be possible to trace back any of the information to you. The anonymous information we will record will only be accessed by the fieldworker who conducts the study and a limited number of researchers in Lilongwe and London.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Submission of a completed questionnaire implies consent to participate.

As participation is anonymous it will not be possible for us to withdraw your data once you have returned your questionnaire.

We may wish to tape-record some respondents. If this is the case separate consent will be sought for this. Tape recordings will again be anonymous so they will not be traceable back to you.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Information sheet for Discrete Choice Experiments:

Participants

Mndandanda wa mfundo wa…….. mu kafukufuku
Mupatsidwa mndandanda/ tstanetsatane wa mfundozi

Dzina la Project: Kodi magulu a amayi a MaiKhanda ndiwofunika motani kwa a amayi a mMalawi?

Kafukufukuyi wavomerezedwa ndi a bungwe la UCL [Project ID Number]: 2105/001

Dzina, Keyala ya kuntchito ndi keyala ya mkulu wa kafukufuku

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You

Ndikukuitanani inu a ……..kuti mutengepo gawo mu kafukufuku.
Koma mukudziwitsidwa kuti mutha kutengapo gawo mu kafukufukuyi ngati mukufuna. Kusankha kusatengapo gawo mu kafukufukuyi sikubweretsa vuto lirilonse kwa inu. Musanaganize kutengapo gawo kapena ayi ndi chinthu chofunikira kwambiri kuti muwerenge mndandanda wa mfundozi bwino ndikuzimvetsa, komanso mutha kukambirana ndi amzanu ngati mukufuna. Mutha kutifunsa ngati simukumvetsa chilichonse kapena ngati mukufuna mfundo zina.

Tsatanetsatane wa kafukufuku

Cholinga cha kafukufukuyi ndi kufuna kulondoloza mmene amayi amawonera kapena kuyesa ubwino wa zigawo kapena mbali zosiyanasiyana za moyo wabwino/ wopambana kuti zingakhuzidwe bwanji ndi magulu a amayi a Maikhanda.
Tikuitana amayi amene anamaliza komanso amene sanamalize kuyankha mafunso okhuzana ndi umoyo wabwino omwe adakonza ndi a bungwe la zaumoyo pa dziko lonse la WHO kuti amalize, ncholinga choti asankhe magawo a umoyo wabwino amene amawawona kuti a ndi pamwamba.
Mfundo zenizeni zoyenera kuchita zilongosoledwa mwatsatanetsatane musanapange chisankho kutenga mbali pa zochitikazi.
Ngati mungavomere kutenga nawo mbali, zochitikazi zitenga pafupifupi ola limodzi ndipo zichitika mmudzi momuno.
Dziwani kuti patha kupezeka mafunso ena amene simukufuna kuyankha. Sindinu okakamizidwa kuyankha mafunsowa komanso ndinu omasuka kusiya kutengapo gawo mu kafukufukuyi nthawi iliyonse.
Tikuwona kuti ndi pofunika kuti mayi ngati inu muthe kunenapo maganizo anu pa zimene mukukonda pa kusiyana kusiyana kwa moyo wabwino/ wapamwamba.
Ngati muvomere kutengapo gawo, dzina lanu sililembedwa kuti palibe amene angathe kukupezani potsatira mfundo zimene munapereka.
Nkhani zimene titalembe pakucheza nanu, zikhala ndi alangizi amene akuyendetsa kafufukuyi kuno komanso ndi anthu ochepa amene akonza kafukufukuyi ku Lilongwe ndi ku mangalande.
Ngati musankhe kutengapo gawo, tsatanetsatane wa mfundoyu mupatsidwa kutimusunge ndi kusaina pepala yotsimikiza chisankho chanu. Mukatsiriza kuyankha mafunso onse ndi kupereka, zikutanthauza kuti mwavomereza kutengapo gawo.
Pozindikira kuti kutengapo gawokwanu ndi kwa chinsinsi, dziwani kuti pakhala povuta kuchotsa mfundo kapena maganizo anu mu kafukufuku pamene mwasiya kutengapo gawo.
Titha kujambula kucheza kwathu ndi anthu ena. Kotero kuti pafunika kuvomereza kutero mwapadera. Kujambulaku kukhalanso kosunga chinsinsi cha amene analankhulayo.
Zili kwa inu kutenga nawo mbali kapena ayi. Ngati mutavomere kutenga gawo mukafukufukuyi, dziwani kuti mutha kusiya nthawi iliyonse angakhale posapereka chifukwa.
Mfundo zonse zomwe titenge kuchokera kwa inu zisungidwa potsatira malamulo oteteza mfundozi amene anakhazikitsidwa mchaka cha 1998

Information sheet for Contingent Valuation pilot study:

Information Sheet for ……Participants…… in Research Studies

You will be given a copy of this information sheet.

Title of Project in lay terms: **What are MaiKhanda Women's Groups worth to Malawian Women?**

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: **2105/001**

Name, Work Address and Contact Details of the Principal Researcher

Timothy Colbourn
Parent and Child Health Initiative (PACHI)
Amina House
Paul Kagame Road roundabout
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+265 888 159 231
t.colbourn@ich.ucl.ac.uk

We would like to invite ……You…… to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Insert Details of Study:

This research aims to determine how women value the MaiKhanda Women's Group intervention.

We are inviting women to answer a questionnaire containing information about MaiKhanda Women's Groups, your income and how much you would be willing to pay to support the MaiKhanda Women's Groups.

If you agree to take part the task will take about 20 minutes of your time and will be done right here in your village so you don't need to go anywhere.

There may be some questions that you don't want to answer. This is completely fine – you don't have to answer any questions you don't want to and you are free to drop out of the study at any time.

We think it is important that women like you get to express their preferences for different areas of quality of life.

If you agree to take part in the study your name will not be recorded so that it will not be possible to trace back any of the information to you. The anonymous information we will record will only be accessed by the fieldworker who conducts the study and a limited number of researchers in Lilongwe and London.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Submission of a completed questionnaire implies consent to participate.

As participation is anonymous it will not be possible for us to withdraw your data once you have returned your questionnaire.

We may wish to tape-record some respondents. If this is the case separate consent will be sought for this. Tape recordings will again be anonymous so they will not be traceable back to you.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Information sheet for MaiKhanda Women's Groups and Quality of Life study:

Information Sheet for ……Participants…… in Research Studies
(*define target group i.e. Parent/Guardian/Child/Teacher*)

You will be given a copy of this information sheet.

Title of Project in lay terms: **How do MaiKhanda Women's Groups affect Women's Quality of Life?**

This study has been approved by the UCL Research Ethics Committee [Project ID Number]: **2105/001**
And the National Health Sciences Research Council of Malawi Ministry of Health [Approval Number]: **NHSRC/696**

Name, Work Address and Contact Details of the Principal Researcher

Timothy Colbourn
Parent and Child Health Initiative (PACHI)
Amina House
Paul Kagame Road roundabout
P.O. Box 31686
Lilongwe 3
+265 888 159 231
t.colbourn@ich.ucl.ac.uk

We would like to invite ……You…… to participate in this research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Insert Details of Study:

This research aims to determine how MaiKhanda Women's Groups which aim to improve the health of mothers and babies affect women's quality of life.

We are inviting women who either have or have not participated in the MaiKhanda Women's Groups to complete a World Health Organisation questionnaire on quality of life and to complete tasks whereby they have to make choices as to which areas of quality of life are more important to them. One in five women will also be asked to complete a questionnaire on how much they value MaiKhanda Women's Groups.

If you agree to take part the study will take about one hour of your time and will be done right here in your village so you don't need to go anywhere.

There may be some questions that you don't want to answer. This is completely fine – you don't have to answer any questions you don't want to and you are free to drop out of the study at any time.

We think it is important that women like you get to express their views on their quality of life.

If you agree to take part in the study your name will not be recorded so that it will not be possible to trace back any of the information to you. The anonymous information we will record will only be accessed by the fieldworker who conducts the study and a limited number of researchers in Lilongwe and London.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Submission of a completed questionnaire implies consent to participate.

As participation is anonymous it will not be possible for us to withdraw your data once you have returned your questionnaire.

We may wish to tape-record some respondents. If this is the case separate consent will be sought for this. Tape recordings will again be anonymous so they will not be traceable back to you.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Mndandanda wa mfundo za kuyeza umoyo wabwino (WHOQoL-BREF):

Mndandanda wa mfundo wa.....Participants..... mu kafukufuku
Mupatsidwa mndandanda/ tstanetsatane wa mfundozi

Dzina la polojekiti	Kodi magulu a amayi a maikhanda ndi amayi oyembekezera kapena zimene zimachitika kamba kakubadwa kwa mwana ziri ndi zovuta zotani pa umoyo wabwino wa mayi?

Kafukufukuyi wavomerezedwa ndi a bungwe la UCL
[Project ID Number]: 2105/001
Kafukufukuyi wavomerezedwa ndi a bungwe la
NHSRC, Malawi Ministry of Health: NSHRC/696

Dzina, Keyala ya kuntchito ndi keyala ya mkulu wa kafukufuku

Timothy Colbourn
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Ndikukuitanani inu a ……Inuyo……..kuti mutengepo gawo mu kafukufuku.
(Inuyo kapena mwana wanu)

Koma mukudziwitsidwa kuti mutha kutengapo gawo mu kafukufukuyi ngati mukufuna. Kusankha kusatengapo gawo mu kafukufukuyi sikubweretsa vuto lirilonse kwa inu. Musanaganize kutengapo gawo kapena ayi ndi chinthu chofunikira kwambiri kuti muwerenge mndandanda wa mfundozi bwino ndikuzimvetsa, komanso mutha kukambirana ndi amzanu ngati mukufuna. Mutha kutifunsa ngati simukumvetsa chilichonse kapena ngati mukufuna mfundo zina.

Tsatanetsatane wa kafukufuku

Cholinga cha kafukufukuyi ndi kufuna kudziwa mmene magulu a maikahanda amene cholinga chawo ndi kutukula miyoyo ya amayi, makanda komanso u
Tikuitana amayi amene anatengapo gawo komanso sanatengepo gawo mu magulu aMaikhanda, amene sanatengepo pakati posachedwapa kapena amene sanabelekepo posachedwapa ndikumaliza mndandanda wa mafunso a kafukufuku wa WHO okhuzana moyo wapamwamba/ wabwino ndiponso kumaliza ntchito ncholinga choti athe kusankha zigawo kapena mbali zofunikira za moyo wapamwamba/ wabwino kwa iwowo.
Ngati mutavomereze kutengapo kuti ticheze nanu, kucheza kwathu kutenga pafupifupi ola limodzi ndipo kuchitika mmudzi momuno kuti musavutike kuyenda kupita kutali.
Patha kupezeka mafunso ena amene simungathe kuyankha, dziwani kuti simukuyenera kuyankha funso lirilonse limene inuyo simukufuna, komanso muli omasuka kusiya kutengapo gawo mu kafukufukuyi nthawi liriyonse.
Tikuwona kuti ndi chinthu chofunika kuti anthu ngati inuyo muzikhala omasuka kunenapo maganizo anu pa za umoyo wanu.
Ngati muvomere kutengapo gawo, dzina lanu sililembedwa kuti palibe amene angathe kukupezani potsatira mfundo zimene munapereka.
Nkhani zimene titalembe pakucheza nanu, zikhala ndi alangizi amene akuyendetsa kafufukuyi kuno komanso ndi anthu ochepa amene akonza kafukufukuyi ku Lilongwe ndi ku mangalande.
Ngati musankhe kutengapo gawo, tsatanetsatane wa mfundoyu mupatsidwa kuti musunge ndi kusaina pepala yotsimikiza chisankho chanu. Mukatsiriza kuyankha mafunso onse ndi kupereka, zikutanthauza kuti mwavomereza kutengapo gawo.
Pozindikira kuti kutengapo gawokwanu ndi kwa chinsinsi, dziwani kuti pakhala povuta kuchotsa mfundo kapena maganizo anu mu kafukufuku pamene mwasiya kutengapo gawo.
Titha kujambula kucheza kwathu ndi anthu ena. Kotero kuti pafunika kuvomereza kutero mwapadera. Kujambulaku kukhalanso kosunga chinsinsi cha amene analankhulayo.
Zili kwa inu kutenga nawo mbali kapena ayi. Ngati mutavomere kutenga gawo mukafukufukuyi, dziwani kuti mutha kusiya nthawi iliyonse angakhale posapereka chifukwa.

Mfundo zonse zomwe titenge kuchokera kwa inu zisungidwa potsatira malamulo oteteza mfundozi amene anakhazikitsidwa mchaka cha 1998

Informed Consent Form for …… Participants…… in Research Studies

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Project: **As information sheets above – the same consent form will be used for each of the two.**

This study has been approved by the UCL Research Ethics Committee [Project ID Number: 2105/001] and the Malawi National Health Sciences Research Committee [Approval number: NHSRC/696]

Thank you for your interest in taking part in this research. Before you agree to take part the person organising the research must explain the project to you.

If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you to decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

Participant's Statement

I …….

- have read the notes written above and the Information Sheet, and understand what the study involves.
- understand that if I decide at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately.
- consent to the processing of my personal information for the purposes of this research study.
- understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.
- agree that the research project named above has been explained to me to my satisfaction and I agree to take part in this study.
- I understand that my participation will be tape-recorded and I am aware of and consent to, any use you intend to make of the recordings after the end of the project.
- I agree that my non-personal research data may be used by others for future research. I am assured that the confidentiality of my personal data will be upheld through the removal of identifiers.

Signed: Date:

Mndandanda wa mfundo wa ……. mu kafukufuku

Chonde, tsilizani kulemba mndandanda wa mfundozi mukatha kuwerenga tsatanitsatani wa mfundo zimene mwapatsidwa ndi kulongosoleledwa/ kapena kuphuzitsidwa za kafukufukuyi

Dzina la Polojekiti **What are MaiKhanda Women's Groups worth to Malawian Women?**

Kafukufukuyi wavomerezedwa ndi a bungwe la UCL research ethics committee [Project ID Number: 2105/001] ndi a bungwe la Malawi National Health Sciences Research Committee [Approval number: NHSRC/696]
Tikuti zikomo kwambiri chifukwa chifukwa cha chidwi chanu kutengapo gawo mu kafukufukuyi. Musanavomereze kutengapo gawo, munthu amene wakonza kafukufukuyi akuyenera akulongosolereni za project imeneyi.
Ngati muli ndi mafunso

Mau a wotengapo gawo

Ine …….

- Ndawerenga mfundo zomwe zalembedwa mmwambamu komanso mndandanda wa mfundo za kafukufuku, ndipo ndikumvetsa zimene kafukufukuyi akukhuza
- Ndikumvetsa kuti ngati ndingaganize nthawi iliyonse kufuna kusiya kutengapo gawo mu pulojekitiyi, nditha kudziwitsa oyendetsa kafukufuku ndi kusiya nthawi yomweyo
- Ndasankha/ ndavomereza kuti mfundo zanga zomwe ndapereka zigwiritsidwa ntchito pothandiza kafukufukuyi
- Ndikumvetsa kuti mfundozo zigwiritsidwa ntchito mwachinsinsi ndiponso potsatira malamulo oteteza mfundo ngati zimenezi a *Data Protection Act 1998*.
- Ndikuvomereza kuti mutu wa kafukufukuyi awulongosola bwino ndipo ndakhutira, ndipo ndikuvomereza kutengappo gawo mu kafukufukuyi.
- Ndikumvetsa ndikudziwa kuti mundijambula mau ndikamacheza nanu ndipo ndavomereza kuti mutha kugwiritsa ntchito zomwe mwajambulazo pambuyo pa kafukufukuyu.
- Ndikuvomereza kuti nkhani mbiri yanga yosakhuzana ndi kafukufukuyi itha kugwiritsidwa ntchito ndi anthu ena pa kafukufuku wa mtsogolo.

Signed: Date:

Informed Consent Form for …… Participants…… in Research Studies

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Project: **As information sheets above – the same consent form will be used for each**

This study has been approved by the UCL Research Ethics Committee [Project ID Number: 2105/001] and the Malawi National Health Sciences Research Committee [Approval number: NHSRC/696]

Thank you for your interest in taking part in this research. Before you agree to take part the person organising the research must explain the project to you.

If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you to decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

Participant's Statement

I …….

- have read the notes written above and the Information Sheet, and understand what the study involves.
- understand that if I decide at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately.
- consent to the processing of my personal information for the purposes of this research study.
- understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.
- agree that the research project named above has been explained to me to my satisfaction and I agree to take part in this study.
- I agree that my non-personal research data may be used by others for future research. I am assured that the confidentiality of my personal data will be upheld through the removal of identifiers.

Signed: Date:

Mndandanda wa mfundo wa ……. mu kafukufuku

Chonde, tsilizani kulemba mndandanda wa mfundozi mukatha kuwerenga tsatanitsatani wa mfundo zimene mwapatsidwa ndi kulongosoleledwa/ kapena kuphuzitsidwa za kafukufukuyi

Dzina la Polojekiti **As information sheets above – the same consent form will be used for each**

Kafukufukuyi wavomerezedwa ndi a bungwe la UCL research ethics committee [Project ID Number: 2105/001] ndi a bungwe la Malawi National Health Sciences Research Committee [Approval number: NHSRC/696]
Tikuti zikomo kwambiri chifukwa chifukwa cha chidwi chanu kutengapo gawo mu kafukufukuyi. Musanavomereze kutengapo gawo, munthu amene wakonza kafukufukuyi akuyenera akulongosolereni za project imeneyi.
Ngati muli ndi mafunso

Mau a wotengapo gawo

Ine …….

- Ndawerenga mfundo zomwe zalembedwa mmwambamu komanso mndandanda wa mfundo za kafukufuku, ndipo ndikumvetsa zimene kafukufukuyi akukhuza
- Ndikumvetsa kuti ngati ndingaganize nthawi iliyonse kufuna kusiya kutengapo gawo mu pulojekitiyi, nditha kudziwitsa oyendetsa kafukufuku ndi kusiya nthawi yomweyo
- Ndasankha/ ndavomereza kuti mfundo zanga zomwe ndapereka zigwiritsidwa ntchito pothandiza kafukufukuyi
- Ndikumvetsa kuti mfundozo zigwiritsidwa ntchito mwachinsinsi ndiponso potsatira malamulo oteteza mfundo ngati zimenezi a *Data Protection Act 1998.*
- Ndikuvomereza kuti mutu wa kafukufukuyi awulongosola bwino ndipo ndakhutira, ndipo ndikuvomereza kutengappo gawo mu kafukufukuyi.
- Ndikuvomereza kuti nkhani mbiri yanga yosakhuzana ndi kafukufukuyi itha kugwiritsidwa ntchito ndi anthu ena pa kafukufuku wa mtsogolo.

Signed: Date:

Appendix D

Attributes of women's groups (formative research)

Women's Groups

	Theme	Sub-theme	Sub-sub theme	Attribute (short)	No.	Attribute (as given)	suggested by [a]	Input and Process?; Process and Output?	Optional (depends on Group choice)	Negative?	For who? [b]	
Inputs	***Money***	*Group fund*		Membership fees	1	Group membership fees	TA		Optional		W	
				Group fund	2	Group fund for running their extra curricula activities within the group or implementing strategies	TA		Optional		W	
		Strategy Implementation Cost		Strategy Implementation Cost	3	What is the financial cost to the women implementing the strategies?	TA				W	
		Fines		Fines	4	Fines	TA		Optional	Negative	W	
						What is the penalty for women who do not continue with women's group activities?	TA		Optional	Negative	W	
		Lost income		Lost income from farming	5	Are they missing income from harvesting - is there a seasonal trend?	TA			Negative	W	
				Opportunity Cost (General)	6	The opportunity cost of the women attending the groups.	TA			Negative	W	
		Money (General)		Money (General)	7	money	TA				W	
	Time	*Time spent on WG activities*	*Direct (all groups)*	Time spent at meetings	8	Meeting at least once a month – regularly	PO				W	
						Minimum meetings of one hour	PO				W	
						The time at which the group is running the action cycle i.e number of meetings held	PO				W	
				Time on WG activities	9	Time and energy is spent by Women Group members as they engage themselves in WG activities	PO				W	
				Time writing minutes	10	Documentation of minutes in the women groups	PO				W	
			Indirect (optional specific activities)	Time in WG Gardens	11	Time in group gardens	TA		Optional		W	
				Time protecting Wells	12	Time protecting wells, moulding bricks for clinics etc.	TA		Optional		W	
				Time moulding Bricks for Clinics	13				Optional		W	
		Away from other activities		Less time Gardening	14	Time away from gardening (esp. during planting and harvesting)	TA			Negative	W	
				Less time for Housework	15	Time away from house work	TA			Negative	W	
				Opportunity Cost (General)	16	The opportunity cost of the women attending the groups.	TA			Negative	W	
		Time (General)		Time (General)	17	Time	TA				W	
	energy			Energy spent on WG activities	19	Time and energy is spent by Women Group members as they engage themselves in WG activities	PO				W	
	material			Meeting Huts	20	Meeting huts (especially rainy season)	TA		Optional		W	
				Picture Cards	21	picture cards for teaching/learning	TA		Optional		W	
	Social	*Permission*		Family Permission	22	family permission	TA				W	C
		Acceptance		Community Acceptance of programme	23	acceptance of programme by community/leaders	TA				W	C
				Leaders Acceptance of programme	24						W	C
		Others motivation		Meeting Without Facilitator	25	If group is able to meet in absence of WGF	PO		Optional		W	F
				Enough People for meeting	26	Meeting at least an average number of women group members	PO		Optional		W	
	Personal	*Motivation*	*Internal Esteem needs*	Accomplishment	27	commitment to seeing the programme through and achieving goals	TA				W	
				Gaining Knowledge	28	to gain knowledge on MNH	PO				W	
			Social Needs	Perceived Social Benefits	29	perceived benefits (financial, health social)	TA				W	
			Safety Needs	Perceived Financial Benefits	30	perceived benefits (financial, health social)	TA				W	
				Percieved Material Benefits	31	expectations like handouts-nutritious foods, infrastructure development i.e sherlter for ANC clinic, boreholes etc...	PO				W	
			Physiological Needs	Perceived Health Benefits	32	perceived benefits (financial, health social)	TA				W	
			Motivation (General)	Motivation (General)	33	Motivation	TA				W	
						motivation	TA				W	
		Personal Skills	*Critical Thinking*	Critical Thinking	34	critical thinking	TA	Input and Process			W	
			Problem Solving	Problem Solving	35	problem solving	TA	Input and Process			W	
			Negotiating	Negotiating	36	negotiating	TA	Input and Process			W	
			Teamwork	Teamwork	37	teamwork	TA	Input and Process			W	
			Leadership	Leadership	38	Enhance power in women to lead discussions on MNH issues	PO	Input and Process			W	
			Advocacy	Advocacy	39	advocacy	TA	Input and Process			W	
		Education	*Writing*	Writing Minutes	18	Documentation of minutes in the women groups	PO		Optional		W	F
		Trust		Trust in programme	40	trust in the programme/activity	TA				W	F C
Processes	***Education***	*Facilitation*		Facilitation of Strategy Identification	41	Facilitate the identification of locally appropriate and relevant strategies to address MNH issues	TA					F
				Increase Facilitators Skills	42	Increase the knowledge and skills of the facilitators	TA					F
						Build the capacity of facilitators to manage and support groups	TA					F
		Peer learning		Peer Learning for WG members	43	Peer support and learning for women attending groups and women who are directly targeted with health education messages by WG members	TA	Process and Output			W	
				Health Messages by Peers	44			Process and Output			W	
		Health Education		Increase MNH Knowledge	45	Increase women's knowledge about how to look after themselves during pregnancy	TA				W	
				Care Seeking Practices Education	46	Health education and behaviour change around care practices	TA	Process and Output			W	
		General Education		Problem Identification	47	Identification of problems and needs	TA				W	
				Causes Identification	48	Identification of underlying causes of problems	TA				W	
				Solutions Identification	49	Identification of solutions	TA				W	
		Capacity building		Capacity Building for Health	50	Capacity building to take control of health	TA				W	F
	Personal skills	*Using Personal Skills*	*Critical Thinking*	Critical Thinking	51	critical thinking	TA	Input and Process			W	
			Problem Solving	Problem Solving	52	problem solving	TA	Input and Process			W	
			Negotiating	Negotiating	53	negotiating	TA	Input and Process			W	
			Teamwork	Teamwork	54	teamwork	TA	Input and Process			W	
			Leadership	Leadership	55	Enhance power in women to lead discussions on MNH issues	PO	Input and Process			W	
			Advocacy	Advocacy	56	advocacy	TA	Input and Process			W	

	Theme	Sub-theme	Sub-sub theme	Attribute (short)	No.	Attribute (as given)	suggested by [a]	Input and Process?; Process and Output?	Optional (depends on Group choice)	Negative?	For who? [b]	
	Encouragement	*Encourage attendance of 4 ANC visits*		Encourage attendance of 4 ANC visits	57		TA				W	
						Encourage women to attend (at least 4) antenatal visits and postnatal check ups						
		Encorage attendance of Post-natal Check-up		Encorage attendance of Post-natal Check-up	58		TA				W	
						Encourage women to attend (at least 4) antenatal visits and postnatal check ups						
		Encourage HF delivery		Encourage HF delivery	59	Encourage women to give birth in a health facility	TA				W	
						Help ensure women don't delay in seeking skilled care	TA				W	
	Behaviour change	*Decision Making*	*Making Decision to Seek Medical Care*	Making Decision to Seek Medical Care	60		PO	Process and Output			W	
						Behavior change – decision making in seeking medical attention when pregnant						
						improved decision making/outcomes (three delays model)	TA	Process and Output			W	
						Health education and behaviour change around care practices	TA	Process and Output			W	
						Changes in care seeking behaviour, etc	TA	Process and Output			W	
						women epowerment on decision making regarding health choices and health seking behaviour	PO	Process and Output			W	
						Empowered communities in particular women to lead in data collection and making decision regarding MNH issues	PO	Process and Output			W	
			Making Better decisions	Making Better decisions	61	Better decisions	TA	Process and Output			W	
						decision making	TA	Process and Output			W	
		Making Changes in Care Seeking Practices		Making Changes in Care Seeking Practices	62	Changes in care practices, etc	TA	Process and Output			W	
						women epowerment on decision making regarding health choices and health seking behaviour	PO	Process and Output			W	
	self-determination	*Increase Confidence*		Increase Women's Confidence	63	Build women's confidence	TA				W	
		Increase Self Esteem		Increase Women's Self Esteem	64	Self-esteem	TA				W	
		Increase Agency		Increase Women's Agency	65	Agency	TA				W	
		Empowerment		Women's Empowerment	66		TA	Process and Output			W	
						Empowerment i.e. opportunity to articulate experiences within the group and with wider community including health care providers						
						Psychological empowerment	TA	Process and Output			W	
						Enhance power in women to lead discussions on MNH issues	PO	Process and Output			W	
						women epowerment on decision making regarding health choices and health seking behaviour	PO	Process and Output			W	
	Social	*Collective Action*	*Collective Action*	Collective Action	67	Collective action	TA	Process and Output			W	C
						Male involvement and involvement of key players (local leaders)	PO	Process and Output			W	C
						Empowered communities in particular women to lead in data collection and making decision regarding MNH issues	PO	Process and Output			W	C
			Implementing Strategies	Implementing MNH Strategies	68	Effective implementation of solutions	TA	Process and Output			W	C
						Implementation of strategies linking to problems identified and MNH	PO	Process and Output			W	C
		Democracy		Democracy	69	Democracy	TA	Process and Output			W	C
		Sharing		Increase Sharing	70	Increased sharing	TA	Process and Output			W	C
						Increased reciprocity	TA	Process and Output			W	C
		Networking		Improve Networks	71	Improved networks – more flexible, more diverse, more inclusive	TA	Process and Output			W	C
				Improve Links to Stakeholders	72	Links to other stakeholders / organisations	TA	Process and Output			W	C
						A strengthened linkage between communities and various stakeholders in trying to work together to reduce Maternal and Neonatal health.	PO	Process and Output			W	C
						Male involvement and involvement of key players (local leaders)	PO	Process and Output			W	C
						Linkages with other govt departments and NGOs	TA	Process and Output			W	C
						Formal recognition of births and deaths – improved linkages with the primary health care system	TA	Process and Output			W	C
		Male Involvement		Male Involvement	73	Male involvement and involvement of key players (local leaders)	PO	Process and Output			W	C
		Peer Pressure		Peer Pressure	74	peer pressure	PO	Process and Output		Negative?	W	
		Communication	*Communication Strategies*	Communication Strategies	75	communication strategies	TA	Process and Output			W	C
			Rasing Awareness of MNH Issues	Rasing Awareness of MNH Issues	76	Raise awareness of maternal and newborn health problems among women of reproductive age	TA	Process and Output			W	
Outputs	**Money**	*Income Generation*	*Dimba Gardens*	Dimba Gardens	77	Dimba gardens - food as well as income from sales	TA		Optional		W	
						Income generating strategies such as vegetable gardens improve food variety and household wealth for wider community members	TA		Optional		W	
			Other Small Business	Other Small Business	78	Small business - income generation	TA		Optional		W	
						Funds have been generated through various initiatives as such some WGs have opened bank accounts	PO		Optional		W	
		Access to Money	*Group Bank Accounts*	Group Bank Accounts	79	Group bank accounts - financial security	TA		Optional		W	
						Funds have been generated through various initiatives as such some WGs have opened bank accounts	PO		Optional		W	
			Loans	Access to Loans	80	ability to access lons fromother providers like : Opportunity International Bank of Malawi and Total Land Care.	TA		Optional		W	
						increased access to resources and finances	PO		Optional		W	
						establishment of revolving funds which make it easy for the women to access small loans to help in Income Generating Activities.	PO		Optional		W	
						Help with funding	TA		Optional		W	
			Emergency Transport Fund	Emergency Transport Fund	81	emergency transport fund	TA		Optional		W	
		Money (General)		Money (General)	82	Increased resources – financial	TA		Optional		W	
	Physical Resources			Physical Resources	83	Increased resources – physical	TA		Optional		W	C
	Food			Food	84	Dimba gardens - food as well as income from sales	TA		Optional		W	

Theme	Sub-theme	Sub-sub theme	Attribute (short)	No.	Attribute (as given)	suggested by [a]	Input and Process?; Process and Output?	Optional (depends on Group choice)	Negative?	For who? [b]	
					Income generating strategies such as vegetable gardens improve food variety and household wealth for wider community members	TA				W	
Transport			Transport to Health Facilities	85	Better transport to health facilities	TA		Optional		W	
					Help with transport	TA		Optional		W	
					Some communities have acquired bicycle ambulances through WGs	PO		Optional		W	
Health	*Maternal and Neonatal Health*	*Improved Maternal Health*	Improved Maternal Health for WG members	86	Improved MNH	TA				W	
					improved decision making/outcomes (three delays model)	TA				W	
			Improved Maternal Health for other women	87	Women outside groups benefiting from improved MNH	TA					C
		Improved Neonatal Health	Improved Neonatal Health for WG members	88	Improved MNH	TA				W	
					improved decision making/outcomes (three delays model)	TA				W	
			Improved Neonatal Health for other women	89	Women outside groups benefiting from improved MNH	TA					C
		Reduced Maternal Mortality	Reduced Maternal Mortality	90	decreased mortality	TA				W	
					Reduced maternal, neonatal and infant mortality?	TA				W	
					Reduction in number of neonatal and maternal deaths	PO				W	
					improved decision making/outcomes (three delays model)	TA				W	
		Reduced Neonatal Mortality	Reduced Neonatal Mortality	91	decreased mortality	TA				W	
					Reduced maternal, neonatal and infant mortality?	TA				W	
					Reduction in number of neonatal and maternal deaths	PO				W	
					improved decision making/outcomes (three delays model)	TA				W	
	Other Health	*Family Health*	Better Family Health	92	Better health for all family members	TA					C
		Other Health	Reduced Other Mortality	93	decreased mortality	TA					C
			Improved Other Health	94	Reduced illness, etc	TA					C
					Better health, etc	TA					C
	Health Resources (good)	*Mosquito Nets*	More Mosquito Nets	95	More mosquito nets	TA		Optional		W	C
		Mobile Clinics	Mobile Clinics	96	Mobile clinics offering Under Five, Antenatal and Post- Natal services are operational in communities far from health facilities. The clinics were lobbied by WGs	PO		Optional		W	C
					Infrastructure development in some communities for instance in communities where shelters have been built to accommodate mobile clinic services provided by district health office	PO		Optional		W	C
					Influencing policy e.g. provision of satellite clinics to meet primary health care needs	TA		Optional		W	C
					Strategies including mobile health clinics improve access to health care for all community members	TA		Optional		W	C
	Health Resources (bad)	*Overburdening of Health Facilities*	Overburdening of Health Facilities	97	As awareness is raised, can health facilities cope with an increase in demand for their services?	TA	Process and Output		Negative		C
	Changes in Care Seeking Practice	*Increased Delivery at the Health Facility*	Increased HF delivery	98	Increased number of women delivering at health facility	PO				W	
					More than 80% of women within areas where WGs exist are now delivering at H/Fs and fewer women are delivering at home	PO				W	
					Influencing quality of care provided and sought e.g. seeking skilled care for delivery and/or improved basic hygiene (clean delivery kit), increased referrals by TBAs	TA				W	
					Increase in number of health facilities [deliveries?] against number of pregnancies registered	PO				W	
		Increased ANC attendence	Increased ANC attendance	99	Increased number of women attending antenatal	PO				W	
	Health Policy		Policy of Provision of Mobile Clinics	100	Influencing policy e.g. provision of satellite clinics to meet primary health care needs	TA					C
Culture Change	*Change in Beliefs*		Change in Beliefs	101	change in cultural beliefs	PO	Process and Output		Negative?	W	C
	Inputs from Men		More Input from Men	102	Culture change specifically inputs from men at the home and community (leader) level	TA	Process and Output				C
Knowledge	*Health Knowledge*	*MNH Knowledge*	Improved MNH Knowledge	103	improved knowledge on newborn care	TA				W	
					Increase women's knowledge about how to look after themselves during pregnancy	TA				W	
					Improve awareness among women and their families of potential obstetric emergencies	TA				W	
					Increased number of women who are knowledgeable of MNH issues	PO				W	
					Increased awareness on maternal and neonatal health problems among women and on how to prevent their occurrence	PO				W	
					I am better able to explain why I would like to do things (around the birth) a certain way	TA				W	
					The women feel that they have widened their knowldge in maternal and child issues discussed in the gruops	PO				W	
					Raise awareness of maternal and newborn health problems among women of reproductive age	TA				W	
		Health Knowledge (General)	Health Knowledge (General)	104	Health knowledge	TA				W	C
	Agricultural Knowledge		Agricultural knowledge	105	Agricultural knowledge	TA		Optional		W	C
	Other Knowledge	*Advice*	Advice	106	Advice on a variety of subjects	TA				W	
		Literacy	Literacy	107	WGs have also lobbied for adult learning sessions to reduce illiteracy levels among women in communities	PO		Optional		W	
	Human Resources	*Women's knowledge (also see above)*	Increased Capacity of Women	108	Build the capacity of women's groups members to work successfully on joint projects	TA				W	C
					Self-efficacy	TA				W	C
					Increased resources – human	TA				W	C
		Facilitators Knowledge	Increased Facilitators Knowledge	109	Increase the knowledge and skills of the facilitators	TA				F	C
					Build the capacity of facilitators to manage and support groups	TA				F	C
					Increased resources – human	TA				F	C
	Knowledge (General)		Knowledge (General)	110	increased knowledge	TA				W	C

Theme	Sub-theme	Sub-sub theme	Attribute (short)	No.	Attribute (as given)	suggested by [a]	Input and Process?; Process and Output?	Optional (depends on Group choice)	Negative?	For who? [b]		
Behaviour change	*Decision Making*	*Decision to Seek Medical Care*	Decision to Seek Medical Care	111	Behavior change – decision making in seeking medical attention when pregnant	PO	Process and Output			W		
					improved decision making/outcomes (three delays model)	TA	Process and Output			W		
					Health education and behaviour change around care practices	TA	Process and Output			W		
					Changes in care seeking behaviour, etc	TA	Process and Output			W		
					women epowerment on decision making regarding health choices and health seking behaviour	PO	Process and Output			W		
					Empowered communities in particular women to lead in data collection and making decision regarding MNH issues	PO	Process and Output			W		
					Facilitate communication and increase care seeking behaviour in relation to sensitive issues (family planning, STIs etc)	TA	Process and Output			W		
		Better decisions	Better decisions	112	Better decisions	TA	Process and Output			W		C
					decision making	TA	Process and Output			W		C
	Care Seeking Practices		Care Seeking Practices	113	Changes in care practices, etc	TA	Process and Output			W		
					women epowerment on decision making regarding health choices and health seking behaviour	PO	Process and Output			W		
self-determination	*Confidence*	*Confidence about Child Birth*	Confidence about Child Birth	114	I feel more confident about the birth of my child	TA				W		
					I feel more confident that I will know what to do if the birth of my child becomes complicated	TA				W		
		Confidence (General)	Confidence	115	Confidence	TA				W		
					Confidence	TA				W		
					confidence	TA				W		
					Build women's confidence	TA	Process and Output			W		
		Confidence for Lobbying	Confidence for Lobbying	116	They also managed to gain cuorage to lobby support from different stakeholders at community as well as district level	PO	Process and Output			W		
					Women are able to lobby for information on health issues from health workers within their catchment areas	PO	Process and Output			W		
	Self Esteem		Women's Self Esteem	117	Self-esteem	TA				W		
	Agency	*Control over Pregnancy and Birth*	Control over Pregnancy and Birth	118	I feel more in control of my pregnancy and birth	TA				W		
		Agency (General)	Women's Agency	119	Agency	TA				W		
					I feel more in control of my life	TA				W		
					Increased decision-making power	TA				W		
	Empowerment		Women's Empowerment	120	Empowerment i.e. opportunity to articulate experiences within the group and with wider community including health care providers	TA	Process and Output			W		
					Psychological empowerment	TA	Process and Output			W		
					empowerment	TA	Process and Output			W		
					Empowerment: Group members feel much empowered as they are now able to talk and share alot of experiences with other community members on maternal and and child issues	PO	Process and Output			W		
					Empower women	TA	Process and Output			W		
					Women's empowerment and community collaboration improves local health provider and government relationships	TA	Process and Output			W		
			Increased Negotiating Power	121	More negotiating power?	TA				W		
Personal (positive)	*Motivation*	*External Esteem Needs*	Recognition	122	respect	TA				W		
					My family/partner has more respect for me now	TA				W		
					career prospects	TA				W		
			Attention	123	Being listened to	TA				W		
			Social Status	124	Status in the community	TA				W		
		Internal Esteem needs	Accomplishment	125	*see all positive outputs*					W		
			Gaining Knowledge	126	*see 'Knowledge' above*					W		
		Social Needs	Social Benefits	127	Reduced isolation	TA				W		
		Safety Needs	Financial Benefits	128	*see 'Money' above*					W		
			Material Benefits	129	*see 'Physical Resources', 'Food' and 'Health Resources' above*					W		
		Physiological Needs	Health Benefits	130	*see 'Health' above*					W		
	Trust		Trust	131	Increased trust	TA				W		C
					trust	TA				W		C
Personal (negative)	*Getting in Trouble*		Getting in Trouble	132	I get in trouble for spending to much time outside the house	TA			Negative	W		
	Reduced Motivation	*Internal Esteem needs not met*	Lack of Accomplishment	133	Implementation of strategies met to reduce MNH problems has been a burden to some communities as they struggle to mobilize resources	PO			Negative	W		C
					Health care expectations of the women's groups members - can they be met and how damaging is it when they are not met?	TA				W		
Social	*Group Identity*		Group Identity	134	Group identity	TA				W		
	Community Organisation		Community Organisation	135	Organisation of the community in relation to MCH	TA						C
	Community Cohesion		Community Cohesion	136	community cohesion	TA						C
					Helps me feel for connected to my community	TA						C
					social interaction improved within the communities	PO						C
					I now know my neighbours better	TA						C
	Equitable Distribution		Increased Equity in Resource Distribution	137	More equitable distribution of resources	TA				W	F	C
	Overburdening of Economic Resources		Overburdening of Economic Resources	138	Does the economy have the resources to meet the demand from the lives saved?	TA			Negative			C
	Collective Action		Collective Action	139	Collective action	TA	Process and Output					C
					Male involvement and involvement of key players (local leaders)	PO	Process and Output					C
					Empowered communities in particular women to lead in data collection and making decision regarding MNH issues	PO	Process and Output					C
					Providing sisterhood and solidarity for advocacy	TA	Process and Output			W		C
	Leadership		Leadership	140	Development of leaders	TA	Process and Output			W	F	
	Democracy		Democracy	141	Democracy	TA	Process and Output			W		C

Theme	Sub-theme	Sub-sub theme	Attribute (short)	No.	Attribute (as given)	suggested by [a]	Input and Process?; Process and Output?	Optional (depends on Group choice)	Negative?	For who? [b]	
	Participation	*Participation in Development*	Participation in Development	142	Participation : After women particiopated in the women group discussion they are now much able to paticipate in any development at community as well as village level.	PO				W	C
		Participation (General)	Participation (General)	143	Increased participation	TA				W	C
	Support	*Community Support*	Community Support	144	Supportive community	PO					C
					I have more support from my neighbours/community	TA					C
					Social support	TA					C
					Support in a crisis e.g during conflict or economic hardship	TA					C
		Peer Support (women)	Peer Support (women)	145	Peer support and learning for women attending groups and women who are directly targeted with health education messages by WG members	TA	Process and Output			W	
					Providing sisterhood and solidarity for advocacy	TA	Process and Output			W	
					Provide support for women to talk to their husbands and other family members about maternal and newborn health problems	TA	Process and Output			W	C
					Stress reduction e.g if one mother is anxious or stressed about a problem	TA	Process and Output			W	
			Safe Place to Talk	146	Provide a safe space for women to talk amongst themselves	TA				W	
		Support (General)	Support (General)	147	Support	TA	Process and Output			W	C
	Sharing		Increased Sharing	148	Increased sharing	TA	Process and Output			W	C
					Sharing of ideas in relation to many different development activities	TA	Process and Output			W	C
					Increased reciprocity	TA	Process and Output			W	C
	Networking	*Networking for Community gain*	Improved Networks	149	Improved networks – more flexible, more diverse, more inclusive	TA					C
			Improved Links to Stakeholders	150	Links to other stakeholders / organisations	TA					C
					A strengthened linkage between communities and various stakeholders in trying to work together to reduce Maternal and Neonatal health.	PO					C
					Linkages with other govt departments and NGOs	TA					C
			Involvement of Leaders	151	Male involvement and involvement of key players (local leaders)	PO	Process and Output				C
			Improved Links to Health Providers	152	Women's empowerment and community collaboration improves local health provider and government relationships	TA	Process and Output				
					Formal recognition of births and deaths – improved linkages with the primary health care system	TA	Process and Output				C
		Networking for Personal gain	Improved Networks for Personal Opportunities	153	Networking for other opportunities e.g jobs or income or credit	TA	Process and Output			W	
	Male Involvement		Male Involvement	154	Male involvement and involvement of key players (local leaders)	PO	Process and Output				C
	Gender relations (good)		Improved Gender Relations	155	Help in dealing with gender issues	TA				W	C
					My family/partner has more respect for me now	TA				W	C
					Provide support for women to talk to their husbands and other family members about maternal and newborn health problems	TA				W	C
					communication between spouses and groups improved as seen by sharing ideas.	PO				W	C
	Gender relations (bad)		Marital disputes	156	Marital disputes	TA			Negative	W	C
			Problems witth Husband	157	hindrance in dealing with gender issues	TA			Negative	W	C
					My partner did not like me attending the groups	TA			Negative	W	C
	Family relations (good)		Improved Family Relations	158	Provide support for women to talk to their husbands and other family members about maternal and newborn health problems	TA				W	C
					My family/partner has more respect for me now	TA				W	C
	Family relations (bad)		Problems with Family	159	My family feels threatened my new ideas	TA			Negative	W	C
					My family does not like my new status in the community	TA			Negative	W	C
	Peer Pressure		Peer Pressure	160	peer pressure	PO	Process and Output			W	
	Influence		Influence Over Programme Management	161	Control over programme management	TA				W	
	Collective memory (good)		Collective memory	162	Transactional and collective memory	TA				W	C
	Collective memory (bad)		Past Failure	163	What is the cost/expectation of the wider community if the women's groups/strategies fail to be implemented?	TA			Negative	W	C
	Friendship		Friendship	164	Friendship	TA				W	
					I have made good friends	TA				W	
					I feel less alone than before	TA				W	
					Gossiping	TA				W	
					Social interaction	TA				W	
					increased social interaction and collaboration	TA				W	
	Fun		Fun	165	Fun	TA				W	
	Communication	*Communication with Health System*	Increased Communication with Health System	166	Increased communication with healthcare system	TA				W	C

[a] TA = Technical Advisor; PO = Programme Officer

[b] W = women (personal gain) and babies; F = Facilitator (personal gain); C = Community

Themes and sub-themes were built up by grouping attributes. If an attribute was felt to be in more than one theme it was put in both.

Appendix E

The WHOQoL-BREF (English)

The WHOQoL-BREF

ABOUT YOU I.D. number ☐☐☐☐

Before you begin we would like to ask you to answer a few general questions about yourself: by circling the correct answer or by filling in the space provided.

What is your **gender**? Male Female

What is your **date of birth**? _____ / _____ / _____
Day / Month / Year

What is the highest **education** you received?
None at all
Primary school
Secondary school
Tertiary

What is your **marital status**?
Single Separated
Married Divorced
Living as married Widowed

Are you currently **ill**? Yes No

If something is wrong with your health what do you think it is?_____

Instructions

This assessment asks how you feel about your quality of life, health, or other areas of your life. **Please answer all the questions.** If you are unsure about which response to give to a question, **please choose the one** that appears most appropriate. This can often be your first response.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last two weeks.** For example, thinking about the last two weeks, a question might ask:

		Not at all	Not much	Moderately	A great deal	Completely
	Do you get the kind of support from others that you need?	1	2	3	4	5

You should circle the number that best fits how much support you got from others over the last two weeks. So you would circle the number 4 if you got a great deal of support from others as follows.

		Not at all	Not much	Moderately	A great deal	Completely
	Do you get the kind of support from others that you need?	1	2	3	4	5

You would circle number 1 if you did not get any of the support that you needed from others in the last two weeks. Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

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		Very poor	Poor	Neither poor nor good	Good	Very good
1 (G1)	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2 (G4)	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3 (F1.4)	To what extent do you feel that (physical) pain prevents you from doing what you need to do?	1	2	3	4	5
4 (F11.3)	How much do you need any medical treatment to function in your daily	1	2	3	4	5

	life?					
5 (F4.1)	How much do you enjoy life?	1	2	3	4	5
6 (F24.2)	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7 (F5.3)	How well are you able to concentrate?	1	2	3	4	5
8 (F16.1)	How safe do you feel in your daily life?	1	2	3	4	5
9 (F22.1)	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10 (F2.1)	Do you have enough energy for everyday life?	1	2	3	4	5
11 (F7.1)	Are you able to accept your bodily appearance?	1	2	3	4	5
12 (F18.1)	Have you enough money to meet your needs?	1	2	3	4	5
13 (F20.1)	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14 (F21.1)	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
15 (F9.1)	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16 (F3.3)	How satisfied are you with your sleep?	1	2	3	4	5
17 (F10.3)	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18 (F12.4)	How satisfied are you with your capacity for work?	1	2	3	4	5
19 (F6.3)	How satisfied are you with yourself?	1	2	3	4	5
20 (F13.3)	How satisfied are you with your personal relationships?	1	2	3	4	5
21 (F15.3)	How satisfied are you with your sex life?	1	2	3	4	5
22 (F14.4)	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23 (F17.3)	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24 (F19.3)	How satisfied are you with your access to health services?	1	2	3	4	5
25 (F23.3)	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to **how often** you have felt or experienced certain things in the last two weeks.

		Never	Seldom	Quite often	Very often	Always
26 (F8.1)	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	1	2	3	4	5

Did someone help you to fill out this form?.....

How long did it take to fill this form out?.....

Do you have any comments about the assessment?

.....

.....

.....

.....

THANK YOU FOR YOUR HELP

Appendix F

The WHOQoL-BREF (Chichewa)

The WHOQoL-BREF I.D. number | | | | |

Tikudziweni

Musanayambe, tikadakonda mutayankha mafunso pang'ono okhudzana ndi inu: pozunguliza yankho lolondola kapena polemba yankholo m'mizere yotsatilayi.

Kodi ndinu amuna kapena akazi? Amuna Akazi

Kodi tsiku lanu lakubadwa ndiliti? _____/_____/_____
Tsiku Mwezi Chaka

Kodi munafika pati ndi maphunziro anu?
- sindinapitepo ku sukulu
- pulayimale sukulu
- sekondale sukulu
- maphunziro opitilira sekondale sukulu

Kodi muli pabanja?
- sindinakwatirepo
- okwatira
- timakhala limodzi koma tilibe setifiketi ya kutchalitchi kapena kwa DC
- tinasiyana koma banja silinathe
- banja linatha
- namfedwa

Kodi panopa mukudwala?
- eya
- ayi

Ngati muli ndi vuto la umoyo mukuganiza kuti ndichani?
_____

Malangizo
Mafunso otsatilawa akufuna kudziwa za zomwe mukumvera zokhudzana ndi kupambana kwa moyo wanu, umoyo kapena zinthu zina zokhudza moyo wanu. **Chonde yankhani mafunso** onse. Ngati mukukayikira yankho limene mukufuna mupereke, chonde sankhani lomwe likuwoneka ngati lokhonza. Nthawi zambiri yankholi limakhala lomwe munaliganizila poyamba.

Chonde kumbukirani mulingo omwe mumadziyika, ziyembekezo zanu, zomwe zimakusanagalatsani, ndi nkhawa zanu. Tikufunsani kuti muganizire za moyo wanu **m'sabata ziwiri zapitazi**. Mwachitsanzo, poganizira masabata awiri apitawa, mukhonza kufunsidwa:

	Kodi mumalandira chinthandizo choyenera chimene mumafuna kuchokera kwa anthu ena?	Ayi 1	Pang'ono 2	Pakatikati 3	Kwambiri 4	Chonse 5

Muzungulize nambala yomwe ikulongosola bwino kuchuluka kwa chithandizo chomwe munalandira kuchokera kwa anthu ena m'sabata ziwiri zapitazi. Choncho munakazungi nambala 4 ngati munalandira chithandizo kwambiri kuchokera kwa anzanu ena motere.

	Kodi mumalandira chinthandizo choyenerera chimene mumafuna kuchokera kwa anthu ena?	Ayi 1	Pang'ono 2	Pakatikati 3	Kwambiri 4	Chonse 5

Munakazunguliza nambala 1 ngati simunalandire chithandizo chilichonse chomwe munafuna kuchokera kwa anthu ena m'sabata ziwiri zapitazi. Chonde werengani funso lililonse, ganizilani za malingaliro anu ndipo zungulizani namabala pa mulingo omwe yankho lolondola kwa inuyo layikidwa pa funso lililonse.

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		Sulibwino kwambiri	Sulibwino	Uli pakatikati	Ulibwino	Ulibwino kwambiri
1 (G1)	Mukaziona, moyo wanu ndiwapambana bwanji?	1	2	3	4	5

		Osakhutitsidwa kwambiri	Osakhutitsidwa	Pakatikati	Okhutitsidwa	Okhutitsdwa kwambiri
2 (G4)	Kodi ndinu okhutira bwanji ndi umoyo wanu?	1	2	3	4	5

Mafunso otsatilawa akufunsa za mulingo wa zina zomwe mwakumana nazo m'sabata ziwiri zapitazi.

		Palibe/ayi	Pang'ono	Pakatikati	Kwambiri	Kwambiri zedi
3 (F1.4)	Mukuona ngati kuwawa kwa mthupi kwanu kwakulepheretsani bwanji kuchita zomwe mumafuna kuchita?	1	2	3	4	5
4 (11.3)	Kodi mumafuna chithandizo cha chipatala chochuluka bwanji kuti muchite zofunika kuchita tsiku ndi tsiku?	1	2	3	4	5
5 (F4.1)	Kodi mumasangalala kwambiri bwanji ndi moyo?	1	2	3	4	5
6 (F24.2)	Kodi mukuganiza kuti moyo wanu ndi watanthauzo motani?	1	2	3	4	5

		Ayi/Palibe	Pang'ono	Pakatikati	Kwambiri	Kwambiri zedi
7 (F5.3)	M'makhala ndi chidwi (chomvetsera) choyenera bwanji pakuchita zinthu?	1	2	3	4	5
8 (F16.1)	Kodi mumaona kuti ndinu otetezedwa bwanji pa moyo wanu wa tsiku ndi tsiku?	1	2	3	4	5

		Ayi/Palibe	Pang'ono	Pakatikati	Kwambiri	Kwambiri zedi
9 (F22.1)	Kodi malo amene mumapezeka kapena kukhala kawirikawiri ndi abwino bwanji ku umoyo wanu?	1	2	3	4	5

Mafunso otsatilawa akufuna kudziwa kuti mwakwanitsa bwanji komanso munatha bwanji kuchita zina ndi zina m'sabata ziwiri zapitazi.

		Tilibe/Ayi	Pang'ono	Pakatikati	Kwambiri	Kwambiri zedi
10 (F2.1)	Kodi muli ndi mphamvu zokwanira zochitila zinthu tsiku ndi tsiku?	1	2	3	4	5
11 (F7.1)	Kodi mutha kuvomereza m'mene maonekedwe anu alili?	1	2	3	4	5
12 F(18.1)	Kodi mumakhala ndi ndalama zokwanira kuti mukwanitse zofunikira?	1	2	3	4	5
13 (F20.1)	Kodi muli ndi mwayi otani wotha kupeza zinthu zokuphunzitsani zimene mumafuna pa moyo wanu	1	2	3	4	5
14 (F21.1)	Kodi muli ndi mwayi wotani wochita zinthu za nsangulutso?	1	2	3	4	5
27	Kodi mumakhala ndi chakudya chokwanira kudyetsa banaja lanu?	1	2	3	4	5

		Ndikovuta kwambiri	ndikovuta	pakatikati	Ndikophweka	Ndikophweka kwambiri
15 (F9.1)	Kodi ndikophweka bwanji kwa inuyo kutha kuyendayenda?	1	2	3	4	5

Mafunso otsatiliwa akufuna kudziwa m'mene mwamvera ubwino kapena m'mene mwakhutitsidwira ndizochitika zosiyanasiyana za moyo wanu m'sabata ziwiri zapitazi

		Osakhutitsi -dwa kwambiri	Osakhutit -sidwa	Pakatikati	Okhutitsidwa	Okhutitsidwa kwambiri
16 (F3.3)	Kodi ndinu okhutitsidwa bwanji ndi tulo timene mumapeza mukagona?	1	2	3	4	5
17 F(10.3)	Ndinu okhutitsidwa bwanji ndi m'mene mungakwanilitsire kugwira ntchito zanu za tsiku ndi tsiku?	1	2	3	4	5
18 (F12.4)	Kodi mumakhutitsidwa bwanji ndi m'mene mumangakwanilitsire kugwira ntchito?	1	2	3	4	5
19 (F6.3)	Kodi ndinu okhutitsidwa bwanji ndinu mwini?	1	2	3	4	5
20 (F13.3)	Ndinu okhutitsidwa bwanji ndi m'mene ubale wanu ulili ndi anthu ena?	1	2	3	4	5

		Osakhutitsi-dwa kwambiri	Osakhutit-sidwa	Pakatikati	Okhutitsidwa	Okhutitsidwa kwambiri
21 (F15.3)	Ndinu okhutitsidwa bwanji ndi moyo wanu ogonana ndi achikondi anu?	1	2	3	4	5
22 (F14.4)	Ndinu okhutitsidwa bwanji ndi chithandizo chomwe mumalandira kuchokera kwa anzanu?	1	2	3	4	5
23 (F17.3)	Ndinu okhutitsidwa bwanji ndi m'mene malo anu mumakhala alili?	1	2	3	4	5
24 (F19.3)	Muli okhutira bwanji ndi kupezeka kwa chithandizo cha za umoyo?	1	2	3	4	5
25 (F23.3)	Muli okhutitsidwa bwanji ndi zokhudza ndi mayendedwe (tharasipoti)?	1	2	3	4	5

Funso lotsatilalri likukhudzana ndi m'mene mwamvera kapena kudutsana ndi zinthu zina kawirikawiri bwanji m'sabata ziwiri zapitazi.

		Sizinachiti-kepo	Mwapatali-patali	Kawirikawiri	Kawirikawiri kwambiri	Nthawi zonse
26 (F8.1)	Kodi ndi kawirikawiri bwanji pomwe mumakhala osakondwa monga kukhala a chisoni, otaya mtima, odandauladandaula, kapena okhumudwa?	1	2	3	4	5

Kodi alipo anakuthandizani kuyankha mafunsowa?

_____

Zinakutengerani nthawi yayitali bwanji kuti mumalize kuyankha mafunsowa?

_____

Kodi muli ndi ndemanga iliyonse yokhudzana ndi mafunsowa?

_____

_____

_____

Zikomo kwambiri pakutenga mbali kwanu

Appendix G

WHOQoL-BREF Qualitative Validation

This section contains the full thematic analysis of focus group discussion transcripts used both for qualitative validation of the WHOQoL-BREF (see § 3.2.1.1 on page 59) and for examining the associations between women's group members and the different areas of quality of life captured by the WHOQoL-BREF (see § 4.2.4 on page 95).

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
Are these good questions to ask a person in order to know about their quality of life? **(is this question helping to assess quality of life)** **(how is this question related to women groups or how can it relate to it? {asked in terms of how WGM would answer the question not how WG might effect the response to the question (i.e. effect QoL); also often answered in the context of a post-natal life (woman's life) rather than in relation to how WG might affect QoL})** **(Could the response be different if it was asked on different groups other than of Maikhanda? {this is also the wrong question - the moderator should be asking about how other groups of women might answer the QoL question (i.e. how their QoL might differ to that of WGM) but instead is asking whether other women would give the same response to whether the QoL question is important - due to wrong phrasing of the previous question on how WG might effect the different areas of QoL (QoL questions)})**	***1. How would you rate your quality of life?*** **(related to WG)** **(context of postnatal life)** ***2. How satisfied are you with your health?*** **(how WG might effect the answer)** ***3. To what extent do you feel that (physical) pain prevents you from doing what you need to do?*** **(context of not being able to do household chores)** **(context of work in postnatal life)** ***4. How much do you need any medical treatment to function in your daily life?*** ***(not appropriate because of bicycle ambulance?)*** ***5. How much do you enjoy life?***	"It is appropriate" [FGD3] "Because once one asks how satisfied one is with her life she will answer according to her household; how satisfied she is with her household; whether she has no sickness in the body and is able to find food without difficulties" [FGD3] "Yes. they are related" [FGD5.p3] "Yes it can help… ….Because while they are asking, they want to enlighten us on how our life is. Indicating that they would like to ask how our life is, but suggesting that our life as women we shouldn't be moving around considering how our life is nowadays. So our life today is a health life because we are seeing … a lot of good things." [FGD5.p6] "Yes it is helping to assess quality of life… ...Because they want to know how our life is." [FGD6.p7] "It is appropriate because through Maikhanda we have gained a lot of knowledge which has changed us" [FGD7.p1] {not really answering the question} "The question is important for the benefit of us women, we feel there is food we eat that is giving us good health as well as other various importance's to the pregnancy. So the question is helpful to our life as postnatal. " [FGD5.p8] "It is helpful because once one is healthy is able to contribute towards development, and development at national level" [FGD3] "The question is appropriate" [FGD3.p6] "Yes it's helpful, since we are finding good life; better modes of delivery are spreading now, we have a healthy life." [FGD5.p5] "Yes it is helping because what is being discussed here is appropriate." [FGD6.p6] "It is appropriate because we have a quality life." [FGD6.p3] {respondent having difficulty understanding} "It is relating to quality of life…. ...Yes it is related because of such a reason, it means in our life we are okay, we are not sick and we are carrying out our activities properly" [FGD6.p1] "We are satisfied that the question can appropriately measure quality of life" [FGD7.p2] "Would the answer to the question be affected if the same question was to be asked of another group of women?" [Moderator] "The question is appropriate because it is talking about how we have changed" [FGD7.p10] "The answer to the question would be different because people are different" [FGD7.p10] "It does help to measure whether one has a good life because once one is sick today, sick the following day, he tends to doubt whether things are going to work out for him that year" [FGD3] "That means life is not good" [FGD3] "Shows that your life is not good because of that sickness" [FGD3] "It means you cannot find quality of life…" [FGD6.p2] "Yes it is helping because when you are sick, you don't have energy. So it is helping our quality of life." [FGD6.p1] "It is appropriate, because a lot of things may fail to be done because one has got pain in his/her body" [FGD7.p2] "Yes, it is true, because a sick person cannot manage household chores. " [FGD5.p1] "It is related, since a postnatal woman cannot work while she is sick. So I think it can be related to women because it's not possible for a person to work when she is sick." [FGD5.p4] "Hospitals do help because once one is sick he rushes to the hospital and the doctors after diagnosing you prescribes you medication and make necessary changes when sickness persists, just to save life. This is what we regard as a good life" [FGD3] {question should be 'need of medical treatment to function', not 'availability of hospitals'} "Yes it is helping to assess quality of life because at TBA they cannot do much unlike… for instance you could run out of blood; at TBA they cannot transfuse while you are pregnant, while we want good health from hospital as most of us we need a lot in our bodies. So this question is helping on the part of postnatal mothers." {not answered in context of medical treatment required for yourself to function} "If hospitals were many, then problems would probably decrease" [FGD6.p7] "For us the question is not proper because we have a bicycle ambulance which those going to the hospital can use. It may be proper for others" [FGD7.p9] "...Not necessarily the question needs to be asked still because we also need other things from the hospital apart from the bicycle. We need medicine too from the hospital even though a bicycle would be important" [FGD7.p1] "The question is appropriate because one would like to know whether he is doing well in life or not. " [FGD3] {question asked was 'are you satisfied with your life' rather than 'how much do you enjoy life'} "The question is appropriate because when it is asked to a woman she has to know who she is" [FGD3.p5] {doesn't seem to be answering the question like she understood it}

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"Yes its necessary to know." [FGD5.p2]
		"The question is helpful to women's groups to find good quality of life. Not so?" [FGD5.p10]
		"It is assessing quality of life… ...Because we are happy, not frequently sick, we are usually around our cirlce of friends, happy…." [FGD6.p3]
		"We feel when you are not fine in your life you cannot manage to enjoy life properly." [FGD6]
	(in relation to not getting sick and eating a balanced diet)	"Its relation to quality of life, the kind of enjoyment I get is that I don't get ill frequently and am happy at home when I eat integrated food." [FGD5.p8]
	(in relation to WG)	"The question is proper in assessing quality of life because through Maikhanda we have learnt a lot of things" [FGD7.p5]
	6. To what extent do you feel your life to be meaningful?	{Question comes out as 'what do you think is the value of your life?' women find it difficult to answer:} "It is not appropriate.. …as its meaning is obscure" [FGD3.p5]
		"Even the answer to that question would be confusion " [FGD3.p7]
		"If one was going to be asked that question he would be too confused to give an answer" [FGD3.p1]
		"The question is difficult" [FGD3]
		"If someone was to answer that question, what do you think should be an answer? That what is the meaning of a good life? He would answer saying; 'what have you seen on me?'" [Moderator] ALL: [laugh] "As if he is worthless" [FGD3]
		"Yes it is valid, because they would like to ask us how our life is. So we think it is acceptable for a nursing mother because we have a quality life as we have reduced deaths and illnesses that were occurring frequently. So we have a quality life." [FGD5.p6] {question asked correctly, but not really answered in terms of whether asking if your life is meaningful, is important in order to determine whether you have a good quality of life}
		"There is no-one who would like a meaningless life, and no one likes a worthless life. Hence everybody likes a quality life." [FGD5.p1] {actually in response to asking whether question 13 would be answered differently by WGM and other women}
		"Yes it is helping… ...Because we will be carrying out tasks ourselves at home" [FGD6.p1]
		"Some people they depend on you, and therefore your life has a meaning" [FGD6.p7]
		"Yes it is helping because is shows how much have we changed." [FGD6.p1]
		"The question can be used to measure one's quality of life. The answer to the question would help value his/her life" [FGD7.p2]
	7. How well are you able to concentrate?	"The question is important because one needs to have an interest in things if he is to learn and benefits from that knowledge wherever he goes" [FGD3.p1]
		"A person who is able to concentrate in a conversation, can we say she has a quality life or not? Let me rephrase it that way, maybe" [Moderator] "She has a quality life" [FGD6.p7]
	(in context of learning)	"Yes, it's helping assess quality of life since, when there is some training, you should be listening mmh, to what are they saying. And it's in listening that we are appreciating that this has helped us." [FGD5.p1]
		"We go and meet others to learn more from them" [FGD7.p2]
	(in context of WG teaching them things)	"Yes it is related as we are discussing here it's giving us an example since we understand. Maybe others do not understand however if you ask it again they may understand. This question is essential." [FGD5.p4]
	(in context of joy in doing things)	"The question is necessary because our lives' joy is dependent on what we do" [FGD7.p9]
	8. How safe do you feel in your daily life?	"It is an appropriate question… ….The question is important because in Chitumbuka we would say one who is secure is he who is not too mobile, one who does not provoke others but is charming" [FGD3.p6]
	(WGM feel protected because they meet at the chiefs house)	"As a group we would say we are protected because we meet at the chief's house" [FGD3.p1]
		"This question is not appropriate because asking someone that question would make one wonder that once she says that she is safe she would put the group at risk and instil fear in people's minds" [FGD3.p5] {confusion regarding reason for asking question i.e. someone wanting to check if someone is not secure so they can rob them etc.!}
		"Is it a bad life to be protected the way the president is? It is a good life" [FGD3]
	(security in the context of HIV)	"I think it is an appropriate question because security means one has a good life. Nowadays, for instance, an individual is supposed to go for a blood test to know her status to establish if he has an infection. Once it is established that he is fine he is advised to abstain from men and women or else he will worsen his health. I have a testimony that my blood is fine and my body's security is fine. I do not often get sick" [FGD3.p6]
		"It's helpful since through Maikhanda we have learnt a lot of things…" [FGD5.p10] {not really understanding the question}
		"Yes it is essential, it's helping assess quality of life because it encourages one to live a neat life, either in her body or at home." [FGD5.p3] {this is actually a better answer to question 9 on physical environment}

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"Yes it is measuring quality of life…" [FGD6.p7] "You should be finishing with the reason if you have it…" [Moderator] "Because they want to know how your life is' [FGD6.p7] "How in what way?" [Moderator] "That she is not frequently getting sick, or not…" [FGD6.p7]
		"It can help to measure whether or not one has a good quality of life" [FGD7.p1]
		"When a person is protected it means s/he is living a good life" [FGD7.p9]
	9. How healthy is your physical environment?	"The question is proper because one's life is characterized with where a person is often found if the person is usually found at a bar then his life is not admirable but one is supposed to be associated with a good place because it has a bearing on your character" [FGD3.p1] {question comes out as 'place where one is usually found?' but seems to be answered in a similar manner to 'how healthy is your physical environment?'}
		"Yes it is essential, it's helping assess quality of life because it encourages one to live a neat life, either in her body or at home." [FGD5.p3] {was asked in answer to question 8 on security actually}
		"This question is related because it is asking how good the place is for one's health, isn't that so?" [FGD5.p9]
		"Yes, it is essential because when we are in this life for instance at this group we are gaining knowledge of our life." {not really answering in terms of physical environment}
		"It's helping assess a person's quality of life, since other people when they look at your home they may be looking with pity that you don't have quality life. So when someone looks at you with pity when you don't have quality life maybe they may assist you. Maybe it starts from issues of unhygienic, and others they assist by teaching so that you get quality life." [FGD5.p1] {this was actually asked in response to question 11 on bodily appearance}
		"Yes, it is asking of quality of life because when we meet we share ideas we need in life." [FGD6.p1]
	(related to WG)	"Yes it is related since in the women's group we usually discuss the importance of keeping the homes and our bodies clean." [FGD5.p3]
	(related to learning)	"It is proper… ...Because we learn a lot of things from the groups" [FGD7.p7] {not really understanding the question}
		"We learn a lot of things from a peaceful environment" [FGD7.p5]
	10. Do you have enough energy for everyday life?	"It is appropriate… ...If someone is asking whether you are strong, what they want to establish is whether you are strong enough to work" [FGD3.p4]
		"The question is appropriate, because by answering that you are strong it indicates your capability to work. How can someone who is weak work?" [FGD3.p5]
		"Yes, it is essential, since in this women's group we can also consider on the part health as related to how your body is fairing." [FGD5.p6]
		"It is assessing quality of life because it is inquiring how our life is, if it is okay…" [FGD6.p6]
		"The thing is if you have appropriate energy that would allow you to complete all that work" [FGD6.p2] {actually in answer to question 17}
		"Yes it is helping assess quality of life because others when they have less energy they are not able to do work at their home all day." [FGD6.p1] {actually in answer to question 17}
		"It is helping because you weigh yourself how much energy you have" [FGD6.p1] {actually in answer to question 17}
		"It is proper, because it is meant to establish whether one is living a good life" [FGD7.p3]
		"It is fitting, because we need strength to do what we want to do" [FGD7.p4]
		"It is proper, because for someone to work they need strength" [FGD7.p9]
	(related to WG)	"Yes you have energy, that… at a group like this you may be having a bad day and you cannot work because…" [FGD5.p9]
	(context of sickness)	"It is good because in our life we do not get sick frequently and we are also able to work hard…" [FGD6.p3]
	11. Are you able to accept your bodily appearance?	"It is clear whether someone is living a good life because someone my have a seemingly healthy body but whilst sick" [FGD3] {moderator switches discourse before this by trying to explain saying: 'Can you determine through my appearance whether I am living a good life?', which is a different question}
		"The body shows that one is well to do and eats well but looking at how someone moves it may be clear that the person is not fine" [FGD3] {again looking at external impression of others not internal impression of self}
		"Such a question would confuse me that somebody should ask me whether I am satisfied with how God created me. I would ask him what made him ask me such a question" [FGD3.p5] {actually in response to q19 'how satisfied are you with yourself?' which the moderator seems to have explained incorrectly in terms of physical appearance only}
		"Yes, I am satisfied with how I am. I have never heard someone despise himself whether he is good looking or not" [FGD3.p5] {actually in response to q19 'how satisfied are you with yourself?' which the moderator seems to have explained incorrectly in terms of physical appearance only}

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"It's helping assess a person's quality of life since other people when they look at your home they may be looking with pity that you don't have quality life. So when someone looks at you with pity when you don't have quality life maybe they may assist you. Maybe it starts from issues of unhygienic, and others they assist by teaching so that you get quality life." [FGD5.p1] {answering with respect to physical environment rather than bodily appearance}
		"It is essential because we have required things at our household" [FGD6.p3] {respondents not understanding}
		"It is proper because through the question it would be established whether one is living a good life or not" [FGD7.p3]
	(in relation to dressing/grooming)	"It is necessary that you groom yourself at your household, you look neat" [FGD.p5]
	(in relation to pregnancy)	"When you set a custom in relation to the meetings and that someone is pregnant yah! And we take the pregnant person to hospital and she delivers properly without any problem then she has made a good quality life. She has preserved her life." [FGD5.p6] {not really answering the question}
	(in relation to health)	"It means quality of life just like the way I am looking right now, I have energy and I am not frequently getting ill. And again we can translate it that others are lacking quality of life because of frequent illness." [FGD5.p8]
	(in relation to others not self)	"The thing is about my appearance, I cannot see myself to the satisfaction about how I am looking or what am I doing, but another person in this group can see the acceptance of my bodily appearance." [FGD5.p9]
	(related to WG vs. others)	"The response would be the same.. Would be different because I don't know how the other people would respond." [FGD5.p9] {woman is muddled}
	(not really important)	"The person's appearance, the way she was born, the question and the way we are discussing here, or the way this meeting is not corresponding, because it is saying about appearance yah! " [FGD5.p3]
	12. Have you enough money to meet your needs?	"It is appropriate… ...Because the respondent would say it if he is poor and cannot manage to buy his needs because it is hard. He rarely gets money thrice or once per year. Once he gets money in May, he will get it again the following May and may not be able to buy the things that I need and once you tell someone about your status that particular individual would help you out" [FGD3.p6]
		"It's essential because… to know the way you are, it is [last part not recorded properly]" [FGD5.p7]
		"Yes it is assessing quality of life… ...Because they would like to know how her life is, that is how she is able to meet her needs" [FGD6.p7]
		"It is proper because it determines whether one struggles to raise money" [FGD7.p1]
		"The question is important because a human being has lots of challenges include raising money to meet household needs" [FGD7.p9]
	(related to WG vs. others)	"The responses could be different because of their needs" [FGD5.p9]
	(related to WG vs. others)	"The answer would not be the same, since people's wellbeing differs from one household to the other" [FGD7.p9]
	13. How available to you is the information that you need in your day-to-day life?	"The question is appropriate because it is through learning that you gain a lot of knowledge. It is appropriate because you learn." [FGD3.p1] {although the question was phrased more like 'having the desire to learn' the answer seems OK}
		"The question is appropriate to be asked among a group of women because they are supposed to learn" [FGD3.p4]
		"Yes, this question is essential because it is important to know your life status and it's helpful indeed. " [FGD5.p1]
	(related to WG)	"Yes, it is required because this question is trying to help as women of Maikhanda group know what we could have in our life as well as what we could agree on our life. And it is also giving us lessons in our group on child bearing." [FGD5.p6]
	(related to WGF / health education)	"It is assessing quality of life, because we have agents nearby who are able to tell us what we lack in our health life" [FGD.p6]
	(related to other organisations)	"It is fitting because we learn a lot from different organizations" [FGD7.p10]
	(related to farming knowledge from advisors)	"It is fitting, because through field advisors who come to teach us various ways on how to prepare food, we have learnt a lot on how to prepare food" [FGD7.p4]
	(in context of learning lessons)	"The question is proper because it talks about lessons through which our lives have changed for the better." [FGD7.p1]
	14. To what extent do you have the opportunity for leisure activities?	"The question is appropriate because you would like to establish whether one lives a happy life or not" [FGD3.p1]
		"The question is appropriate, because it is from colleagues where you learn a lot of things" [FGD3] {not sure she understood the question}
		"The question is appropriate, because as a human being you need to have time to enjoy because by doing that you are able to forget about problems. The question is appropriate" [FGD3.p1]
		"Because it is one's choice to be happy" [FGD7.p10]
	(in relation to leisure with others)	"The relationship comes in when a person needs a friend to have leisure time. On his own cannot have leisure. The question is good" [FGD5.p4]
	(related to WG vs. others)	"You could get different answers because you are asking us in a group and a person not in the group, outside, cannot manage to answer it." [FGD5.p9]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(in relation to health)	"Yes, it is related to quality of life because a person who is frequently ill cannot participate in the leisure activity that is go and dance at the meeting" [FGD6.p7]
	27. To what extent do you have enough food to eat?	"It is an appropriate question… ...When someone asks whether one has enough food in the household, they want to establish if the food is enough. Sometimes I have enough food while sometimes not. As I am speaking I am coming from doing casual labour where its payment is cassava because I have no food in my household. Sometimes those asking you may wish to help you" [FGD3.p6] "It is appropriate" [FGD3.p7] "Yes it is... [essential to ask] ...In a way that we should assist each other on how we can save food for the household or how we can find enough food for the household?" [FGD5.p2] "This question is helping, as we have already said a person needs enough food because a person with inadequate food cannot have a good quality life. Therefore, we feel that this a very good question as a person needs enough food to supply his household and eventually a good quality life at home." [FGD5.p1] "It is assessing quality of life because you cannot be happy when there is inadequate food at your home" [FGD6.p6] "Because it is not easy to get food" [FGD7.p9]
	(in relation to health)	"Yes, it is helping, because when you are sick you can't manage to get around." [FGD6.p1] "when you arrange a journey and then you get sick, you cannot manage to go." [FGD6.p1]
	(related to WG vs. others)	"The answer would be the same because the lives of those who have food and those who do not have food are different. Their lives are different" [FGD7.p6]
	15. How well are you able to get around?	"It is appropriate, because once one has no any other body pain can travel but when one is sick you cannot travel" [FGD3.p12] "It is proper, because a mobile person does not depict a good life" [FGD7.p10] {think the respondent is thinking of promiscuity rather than mobility!}
	(in relation to health)	"This question is good; it is required to be asked, because to get around, you should be in good health. Especially when you are not frequently sick you can walk as much as you can, as you are pleased, that is if you have a healthy life and quality life." [FGD5]
	(in relation to visiting the sick)	"It is appropriate, because somebody can move and see the sick when she or he is free" [FGD7.p1]
	16. How satisfied are you with your sleep?	"The question is appropriate, because sometimes one does not sleep due to body pains so the question is appropriate" [FGD3.p4] "The question is appropriate because whenever one sleeps that's an opportunity for his mind to rest. It is imperative for a human being to rest and he wakes up he thinks properly because when one has sleepless nights he is restless" [FGD3.p1] "It is fitting because when one lacks sleep indicates bad life" [FGD7.p1] "It is appropriate because one would establish whether or not one has good sleep" [FGD7.p6]
	(in relation to hygiene of bedding)	"The question, yah, is essential to be asked as we have said, to talk of a human's good quality of life then he need all his needs for instance a house and other things for the house. If we talk of beddings we could then refer to body care like washing the beddings mentioned. If they are not okay, they have lice and other biting things, then you cannot have a good sleep, but you have a good sleep with properly washed beddings. " [FGD5.p3]
	(in relation to health)	"It is assessing quality of life because you cannot sleep properly when you are sick, you could be snivelling. But when you have a quality life you sleep peacefully." [FGD6.p3]
Questions 17 and 18 often answered the same way because	***17. How satisfied are you with your ability to perform your daily living activities?***	"There are several reasons why one may fail to do some work. That question can help us determine whether one is living a good life or not." [FGD3] "Sometimes one may work and sometimes not due to incapacitated hands" [FGD3] "Are you trying to portray that if someone is failing to pound maize, that means she is not living a good life?" [Moderator] "That means her life is not okay" [FGD3]
	(in relation to health)	"If we look closely as a group, we think it's necessary to ask the question. It could also enlighten us when a person has no illness or any problem at home that you work more properly. However, if there is a problem related to illness or something missing at home, then you cannot manage to do all your work at the same time." [FGD5.p6] "The thing is you have appropriate energy that would allow you to complete all that work" [FGD6.p2] {answered in terms of having enough energy, which is question 10}
	(in relation to working for food)	"It is fitting, because we work to get enough food" [FGD7.p7]
	(in relation to working for food)	"It is proper, because for us to get enough food we have to work" [FGD7.p3]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
Questions 17 and 18 often answered the same way because 'daily living activities' = 'work' (housework)	***18. How satisfied are you with your capacity for work?***	"The question is appropriate, because the interviewer wants to establish how the respondent works. It is amazing that sometimes some people work in their homes as if they are in jail, especially this time when it a busy farming period where a person may go to the field and work, whilst pregnant comes back carrying a log of firewood and without resting and proceed to do household chore but someone in her state has to rest because it is easy to miscarry due to overworking" [FGD3.p6] {overworking as a problem - especially whilst pregnant}
		"Yes it's necessary to ask because you could think that aah... [file recording noisy/ not clear] ...and you will notice that you have woken up with good quality life. Or maybe you could say tomorrow I will do such work and after you've slept the following morning you wake up with good health and you discover that you've really managed to do the work. So if you sit and claim that you don't have a good quality life you cannot manage to do the work planned. Therefore we are satisfied to do all the work planned to be done on that day." [FGD5.p1]
		"Yes it is helping assess quality of life, because others when they have less energy they are not able to do work at their home all day." [FGD6.p1] {answered in terms of having enough energy which is question 10}
		"It is proper because one has to plan what to do in the day" [FGD7.p9]
	(related to WG vs. others)	"The answers would be different depending on our different backgrounds" [FGD7.p10]
	19. How satisfied are you with yourself?	"The question is appropriate because each one knows himself better whether he is healthy or not. They know it when their health deteriorates" [FGD3.p5]
		"The question is necessary because when I look at my life it is a happy life. I always do things for myself, I appear responsible and healthy since even other appreciate that I take care of myself. So it is a necessary question." [FGD5]
		"It is helping, because you weigh yourself how much energy you have" [FGD6.p1] {answered in terms of having enough energy which is question 10}
		"It is suitable, because someone with a good life is supposed to be satisfied with his/ her life" [FGD7.p7]
	20. How satisfied are you with your personal relationships?	"The question is appropriate because you would like to establish whether that individual interacts with others otherwise what can one learn by being separated from others? You learn by interacting with others. The question is appropriate" [FGD3.p1]
	(in relation to what others think of your personal relationships)	"Yes, this question could be asked because a person can have a bad behaviour against your friends and your relatives rebuking your behaviour and you listen to that to maintain a good relationship with your friends. Hence we call that a good quality life so that you can be on good terms with your friends. This question can be asked." [FGD5.p1]
		"It is supposed to assess quality of life because when you have strength and happiness you are able to visit to your friend, relative and make her happy." [FGD6.p3]
		"Because you may have a relative who has a bad behaviour and it is better to make friends with a distant person whom you are able to make a very good friendship" [FGD6.p9]
	(in relation to health)	"Yes, it is related, because when you are not sick, you are able to visit your friend properly." [FGD6.p1]
	(needing good life to relate well to others)	"It is suitable because for one to relate well with others need to have a good life" [FGD7.p9]
	21. How satisfied are you with your sex life?	"The question is appropriate, because once people are married, there is no way they can be sleeping separately but together as an indication of marriage" [FGD3.p1] {moderator asks question in terms of sex with spouse - as sex outside of marriage is a taboo subject, especially for women}
		"Yes it is acceptable and should be asked because if you don't have a health life then you can also stay… but if you are strong then.. [words not clear]" [FGD5.p3]
		"It is related, because we do things freely and openly to each other without doubting the other." [FGD5.p3]
		"No, it is because when you are in your house you are free with your husband" [FGD6.p9]
		"It is appropriate… ...In a house where a couple loves each other would not deny each other sex" [FGD7.p7]
		"It is fitting because there should be trust were people come together" [FGD7.p1]
	(in context of good maternal practice/HIV)	"Yes, it's acceptable. It is acceptable since it's concerning us in our good maternal practice group and we tackle issues related to this question. This remains the case since nowadays even during the day you have sex with your husband then there should be 1. A way to go for testing, to know whether yourself or your husband is alright (HIV negative). And 2. We also find a way of protection between the two of us." [FGD5.6}
	22. How satisfied are you with the support you get from your friends?	"The question is appropriate because once one is poor one will need assistance from friends" [FGD3]
		"The question is appropriate, because when an individual is poor even if he gets assistance he is ungrateful, he would always want to get assistance" [FGD3.p2]
		"The question is appropriate because the one asking would like to establish whether the interviewee gets any assistance. The interviewer wants to establish how often the respondent gets assistance" [FGD3.p1]
		"Yes, it's important to ask" [FGD5.p2]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"Yes, it's important to ask… ...Support you get from another person is better compared to the one from yourself." [FGD5.p2]
		"It is related because if you have a good relationship with your friends and you are happy" [FGD6.p3]
	(in the context of teaching/learning through friends)	"Yes they could be the same because on your own you cannot manage… hear other things but from your friend you could hear things. Like now we are teaching each other what we learnt here and it can work the same with others just like we are doing." [FGD5.p4]
	(in the context of being sick and needing support)	"It is fitting, because once one is sick needs friends to pay you visits" [FGD7.p5]
	(related to WG vs. others)	"The answer would not be the same because people differ in their conduct" [FGD7.p6]
	23. How satisfied are you with the conditions of your living place?	"Yes, it is necessary, because the place where a person lives need to have required things like a hospital nearby, clean drinking water nearby, pit latrine, bathroom and toilet at home. These things are workable because this question could help a person understand how far it is from the things he needs." [FGD5.p3]
		"Yes, it is related, because they want to know if the place that I sleep or I stay should be good" [FGD6.p7]
		"It is suitable, because a place where one lives contributes to good life if one likes it" [FGD7.p1]
	(related to WG)	"It is necessary to ask it, since we have been learning something like that question on our group. Its responses could depend on how it was taught since we are learning a lot of things which we practice at home as well as at the group, and we are satisfied with the lessons. We are satisfied because if we practice the lessons of the health personnel therefore our homes or families would be healthy always." [FGD5.p6]
	24. How satisfied are you with your access to health services?	"It is important for women belonging to women's groups whenever we have problems there is no other way but to rush to the hospital" [FGD3]
		"Yes, it is helping to assess quality of life because, when the hospital is close to the people, transportation is not an issue." [FGD6.p7]
	(in relation to health education)	"Yes, the question is necessary, because we are supposed to be satisfied when health agents come and give us advice that we need to practice this and that. Even though they are not giving you a material, they are telling you what to do. And sometimes they come to give us nets and other things and we are satisfied. And this question, it's indeed necessary that it is asked. " [FGD5.p1]
	25. How satisfied are you with your transport?	{also answered in question 15: 'How well are you able to get around'}
	(in context of access to healthcare)	"This question is necessary to us, since as women we face emergency illnesses. So we are required to find emergency transportation like a bicycle, a car, or even a stretcher to take our friend to the hospital." [FGD5.p6]
		"Yes, it is related, because it concerns the type of travel we have when we are going to the hospital" [FGD6.p1]
		"It is clear, because they want the kind of transportation one needs when going to the hospital, so that it is contributing to quality of life" [FGD6.p7]
		"It is an appropriate question, because for one to visit a sick relative at the hospital one needs transport. In our case we are at an advantage, since we have a bicycle ambulance" [FGD7.p1]
	26. How often do you have negative feelings such as blue mood, despair, anxiety, depression?	"The question is appropriate, because one is not supposed to be grudging daily, it is not a good life." [FGD3.p1]
	(in relation to stress and health)	"The question is relevant because if a person is worrying… ...You find yourself worried, therefore your health deteriorates since you have a lot of issues to think about in your heart. Unlike when you have freedom, everything under control and your life has a good health." [FGD5.p3]
		"Yes, it is assessing quality of life, because they want to know how a person's life can be; maybe a child may die and you cannot be happy, or maybe a child getting sick you can't be happy." [FGD6.p6]
	(challenges to life being good)	"It is suitable, because once there are challenges in life it symbolizes there is no good life" [FGD7.p7]
	(related to WG vs. others)	"The answer would be different depending on different backgrounds people come from" [FGD7.p1]
Any other QoL questions to add	***Yes:***	
	No	"All questions have been asked. Out of all the questions that have been asked there cannot be any more questions that have not been asked" [FGD3.p1]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
Gneral opinions regarding WHOQoL-BREF questions	***Related to 'human life'***	"Because it is starting with the genesis of human life, starting from the day he was born to his present position when he is receiving the questions. So we saw that it is true since there are issues related to a day-to-day life, the way it progresses and how he is receiving the medical/ health assistance. Like water, the dangers that a human being faces, all those are related to a human. The questions have come at a right time and they are concerning a human life." [FGD1.p1]
	Related to WG	"they are related to women's groups because women are the ones that take a larger part in family care. When we say family care, if a woman is taking care of her family, therefore most people, children and men, they are taken care of together with the family. " [FGD1.p6]
		"I can see that this question can help women groups to be strong." [FGD2.p8]
		"these questions they are encouraging women's groups on their weaknesses and again they are important because they uplift women lives." [FGD2.p1]
		"they are related since, back in the day there was nothing like this, but now they are found to reduce the problem found in this country." [FGD2.p10] {not really answering the question - many participants found it hard to get their heads round the bit of the FGD on how being in a women's groups may affect the answers to the WHOQoL-BREF questions i.e. how they may affect quality of life}
		"Bad life is where one... ...does not participate in group meetings." [FGD3.p6]
	Learning from questions	"if the questions are given to women like these ones, then in the same way there is learning. Similarly, we will be teaching others while we are learning such questions. if they sink in our hearts and ask us the way we are asked, if we answer them and learn them well, therefore they will make us wise as well as good learners to teach our families." [FGD1.p6]
		"I have learnt on human health and realised what I did not know… ...they have helped me in many ways. I have learnt so many things concerning a human life. It is the whole human behaviour as to how he can be and good maternal health." [FGD2.p2]
		"I would like to comment, these questions since they are enlightening... Yes, at the beginning it was said we would be choosing a right question. However, in my understanding, I have seen that they are questions that are also telling us what to do in our groups. So I can say we should focus because these questions can also give us wisdom, so that we can prevent other things that were lagging behind us. Again, they would like to encourage us for this group to progress, since it is teaching us different things. Unlike our friends, who are not a group like ours, they cannot realize how to respond but to us who meet in this group, sapience is enlightening us about our neonates. Thank you." [FGD5.p6]
		"It is fitting because in the group we learn whether or not one has a good quality of life" [FGD7.p3]
		"We are grateful to Maikhanda for the knowledge we have gained" [FGD7.p2]
	Others may not understand the questions	"As we are here, we understand what is discussed here, unlike other people who are not in the group who would not be able to respond to the question. " [FGD5.p9]
		"They are going to understand considering one's intelligence that maybe this response is related to a human being. But if a person has difficulties to find words to say at that level, she will not be able to respond." [FGD6.p9]
	General comments on FGD	"I have found the discussion very good. No wonder, when you asked some questions you noticed some silence because it is our first experience. Should you come the second time you will notice some improvement. Everyone will at least have an answer and you will be able to compare with the previous visit. There is no wrong we find with the discussion. This is a good thing." [FGD3.p8]
		"Mine is a comment. My comment is, everything that has happened here is enlightening us to do things with potency; and this organization has brought us things that will find us a healthy life. That's my comment." [FGD5.p10]
	(will speak more next time)	"We are free people and we will be freer during your next visit" [FGD7.p9]
	(forgive us for being passive)	"Forgive us for being passive" [FGD7.p2]

Appendix H

Disability Weights

Disability Weights used in Global Burden of Disease 2004 study (WHO, 2004).

Health problem		Disability Weight	Notes	Number of cases		
Category	Specific problem			WHO pilot - Healthy (KCH)	WHO pliot - Healthy (village)	WHO pilot - Sick (KCH)
Health problem Not Stated		NA		-	-	31
Anaemia / weakness	anaemia	0.090	Severe iron deficiency anemia (assuming this as patient is in hospital); Maternal Haemorrhage severe anemia is 0.093; Hookworm anemia is 0.024; Malaria anemia is 0.012	-	-	4
	dizziness	Not listed		-	-	3
	general body weakness	Not listed		-	-	2
	low blood pressure	Not listed		-	-	1
	loss of appetite	Not listed		-	-	4
Cancer	brain tumor	0.750	from disability weights PDF: Note: For all cancer sites, the disability weight is 0.75 for the metastasis stage, and 0.81 in the terminal stage; assuming at least metastasis stage as patient is in hospital	-	-	1
	cancer	0.750	as above	-	-	1
	cervical cancer	0.750	as above	-	-	1
	tumor	0.750	as above	-	-	3
	tumor in the stomach	0.750	as above	1	-	1
Child sick	child burnt	Not listed		-	-	3
	child sick (born with lip problem and got operated)	Not listed		-	-	1
	child sick (eye problem)	Not listed		1	-	0
	child sick (hit with a stone)	Not listed		1	-	0
	child sick (scar not hardening)	Not listed		-	-	1
	child with a fracture	Not listed		-	-	1
	child with a fractured leg	Not listed		-	-	1
	child's head abnormal growth	Not listed		-	-	1
Diabetes	diabetes	0.215	ranges from 0.015 for a case of diabetes to 0.072 for diabetes neuropathy, 0.102 for diabetes amputation, 0.133 for diabetic foot, and 0.552 for diabetes Retinopathy (blindness). Given these cases are in hospital for diabetes they should probably be put as the avergae of all the severe forms: (0.072+0.102+0.133+0.552)/4=0.215	-	-	2
	sugar disease (diabetes)	0.215		-	-	2
Fever / Malaria	fever	0.191	Malaria episodes is 0.191, Neurological Sequelae is 0.471, Malaria anemia is 0.012. Given that the person is in hospital for fever we are assuming it is as bad as Malaria (aslo, dengue fever episodes are similar at 0.197)	-	-	5
	malaria	0.191		-	-	20
	sweating	Not listed		-	-	1
Hypertension / Heart attack / Stroke	heart attack	0.439	Acute Myocardial infarction	-	-	1
	high blood pressure	0.246	Hypertensive heart disease - cases	-	-	6
	hypertension	0.246	Hypertensive heart disease - cases	-	-	1
	stroke	0.920	First-ever stroke cases is 0.920; Long-term stroke survivors are 0.266. Given the person is in hospital we will take the first value (although it seems to high for the person to be interviewed!)	-	-	2
Infection	boil at the back	0.006	High-intensity infections for Hookworm, Ascariasis and Trichuriasis are all 0.006; Schistosomiasis infection is 0.005; others are 0.000	-	-	1
	boil on the breast	0.006	High-intensity infections for Hookworm, Ascariasis and Trichuriasis are all 0.006; Schistosomiasis infection is 0.005; others are 0.000	-	-	1
	cervical infection	0.067	Reproductive tract infection	-	-	1
	cold flu	0.191	Malaria episodes is 0.191, Neurological Sequelae is 0.471, Malaria anemia is 0.012. Given that the person is in hospital for fever we are assuming it is as bad as Malaria (aslo, dengue fever episodes are similar at 0.197); influenza is not specifically listed but from my experience it is about as bad as malaria!	-	-	2
	dental infection	Not listed		-	-	1
	diarrhoea	0.006	High-intensity infections for Hookworm, Ascariasis and Trichuriasis are all 0.006; Schistosomiasis infection is 0.005; others are 0.000	-	-	7
	ear infection	0.023	Otitis media - chronic infection	-	-	5
	eye infection	0.108	Injury to eyes	-	-	1
	eye problem	0.108	Injury to eyes	-	-	2
	eye problem (can't see)	0.108	Injury to eyes	-	-	1
	intestinal infection	0.006	High-intensity infections for Hookworm, Ascariasis and Trichuriasis are all 0.006; Schistosomiasis infection is 0.005; others are 0.000	-	-	1
	kidney infection	0.104	Schistosomiasis - Advanced renal disease	-	-	3
	measles	0.152	Measles - Episodes	-	-	1
	meningitis	0.615	Streptococcus pneumoniae - Episodes: 0.615; Haemophilus influenzae - Episodes: 0.616; Neisseria meningitidis - Episodes: 0.615	-	-	1
	pneumonia	0.279	Lower respiratory infections - Episodes: 0.279	-	-	1
	respiratory system infection	0.279	Lower respiratory infections - Episodes: 0.279 (Uper respiratory infections - Episodes: 0.000 (so unlikely to be in hospital)	-	-	1
	shingles	Not listed		-	-	1
	sore throat	0.070	Upper respiratory infections - Pharyngitis	-	-	1
	sores on the throat	0.070	Upper respiratory infections - Pharyngitis	-	-	3
	STI	0.067	Reproductive tract infection	1	-	3
	urinary bladder infection	0.067	Reproductive tract infection	-	-	1
loss of memory		Not listed		-	-	1

continued on next page

continued:

Health problem		Disability Weight	Notes	Number of cases		
				WHO pilot - Healthy (KCH)	WHO pliot - Healthy (village)	WHO pilot - Sick (KCH)
Category	**Specific problem**					
Pain / Physical injury	abdominal pains	0.082	The only two categories of pain listed are: Low back pain=0.061 and Chronic Pelvic pain=0.122Also, Sprains are 0.064. Could assume all other pains are avearge of these three. Have done analyses with and without these assumptions	-	-	3
	anal pain	0.082	as abdominal pains above	-	-	1
	backache	0.061	Low back pain	-	-	2
	bleeding	0.108	Open wound	-	-	2
	body pains	0.082	as abdominal pains above	-	-	1
	chest pains	0.082	as abdominal pains above	-	-	3
	consistent body itching			-	-	1
	fractured arm	0.180	Fracture: Ulna or radius	-	-	2
	fractured leg	0.271	Patella, tibia or fibula	-	-	1
	general body pains	0.082	as abdominal pains above	-	-	4
	headache	0.082	as abdominal pains above	-	-	6
	headache, general body pains and dizziness	0.082	as abdominal pains above	-	-	1
	hernia	0.061	Herniation	1	-	3
	joint pains	0.082	as abdominal pains above	-	-	1
	kidney problem	0.104	Schistosomiasis - Advanced renal disease	-	-	1
	leg-ache	0.082	as abdominal pains above	-	-	2
	muscle cramps	0.082	as abdominal pains above	-	-	2
	neck stiffness	0.082	as abdominal pains above	-	-	1
	nose bleeding		This is not as bad as 'open wound' is it?	-	-	2
	pain after operation delivery	0.082	as abdominal pains above	-	-	1
	pain when passing out urine	0.122	Chronic pelivic pain (Chlamydia and Gonorrhea)	-	-	1
	stomach ache	0.082	as abdominal pains above	-	-	2
	stomach pains	0.082	as abdominal pains above	-	-	1
	throat sores and general body pains	0.070	Upper respiratory infections - Pharyngitis	-	-	1
	wound on thigh	0.108	Open wound	-	-	1
Pregnancy and Childbirth	after birth stomach complications	Not listed		-	-	1
	delivery by scizor	Not listed		-	-	1
	labour complications	Not listed		-	-	5
	operation (removal of uterus)	Not listed		-	-	1
	post delivery complications	Not listed		-	-	1
	pregnant	Not listed		-	-	1
Respiratory Problems	asthma	0.043	Asthma - cases	-	-	5
	bronchitis	0.279	Lower respiratory infections - Episodes: 0.279	-	-	1
	cough		Not sure whether this case is upper respiratory (weight=0.000) or Lower respiratory (weight=0.271)	-	-	6
	coughing		as above	-	-	1
	difficulties in breathing	0.279	Lower respiratory infections - Episodes: 0.279	-	-	2
	difficulty in breathing	0.279	Lower respiratory infections - Episodes: 0.279	-	-	1
	TB	0.271	Tuberculosis - cases	-	-	7
Stomach complications / vomitting	abdominal complications	Not listed		-	-	1
	consistent vomiting	Not listed		-	-	1
	eating disorders	Not listed		-	-	1
	failure to pass out stool	0.024	Ascariasis (Intestinal obstruction)	-	-	1
	intestinal complication	Not listed		-	-	1
	spleen disfunction	Not listed		-	-	1
	stomach complication	Not listed		-	-	1
	stomach complications	Not listed		-	-	5
	purging	Not listed		-	-	1
	ulcers	0.042	Peptic ulcer disease - Cases not treated with antibiotic	1	-	7
	vomiting	Not listed		-	-	3
Swelling / inflammation	Elephantiasis (swollen legs)	0.111	Lymphatic filariasis: Bancroftian lympoedema=0.106; Brugian lympoedema=0.116; since it is unclear which one it is and they are quite similar, I have used the mid-point 0.111	-	-	1
	skin disease	0.056	Skin diseases - cases	-	-	4
	swollen belly	Not listed		-	-	2
	swollen leg	0.111	as Elephantiasis above			1
	swollen legs	0.111	as Elephantiasis above	-	-	2
Don't know / Doctor not disclosed	doctor has not disclosed	NA		-	-	1
	don't know	NA		-	-	1
	don't know	NA		-	-	4
Didn't want to disclose		NA		-	-	1
Total cases				**6**	**0**	**259**
No health problems				20	24	0
Total Respondents				**26**	**24**	**259**

Appendix I

Sampling procedure

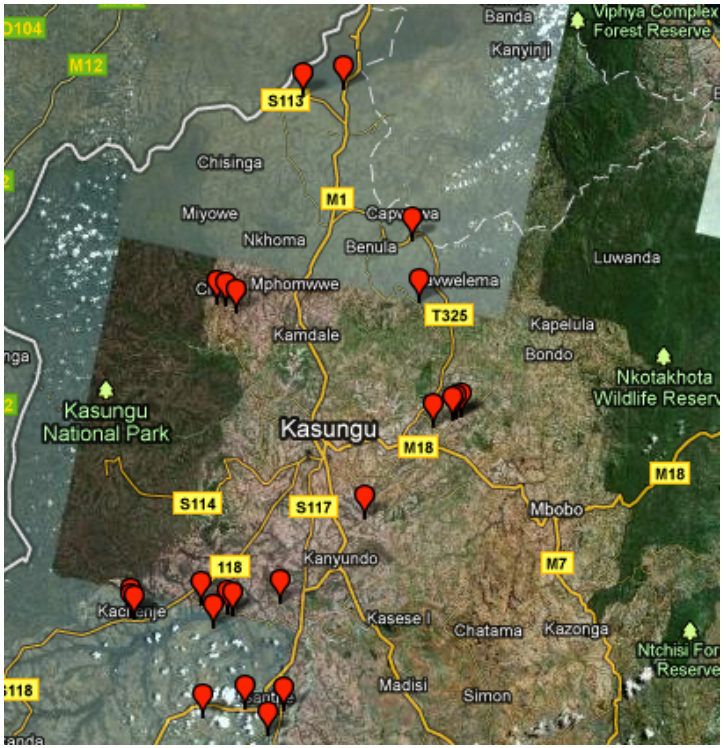
Split by	*Split criteria*	*weight*	*Groups*	*subgroup n*	*Total n*	*Details to ensure complete / representative sample*
Total	None		Total	540	600	
A **Intervention**	Total into 3 equal groups	1	WG member	180	180	Each of 9 CMO supervise 9 WGF who each have 9 WG with 20-30 members each on average
		1	Non-member same vilage (woman)	180	180	Match same number of women from each WG village
		1	Non-member control areas village (woman)	180	180	Random selection needed (each of the 729 Women's Groups have an equal chance of being chosen)
B **District**	Each intervention group (180) split proportionally by no of WG	324	Lilongwe	80	240	
		243	Kasungu	60	180	
		162	Salima	40	120	
C **Supervisor (CMO)**	Each of the 729 Women's Group villages should have an equal chance of being chosen Logistically can't sample 200 different Women's Groups or even all 81 different Women's Group Facilitators (WGF) as would only have 2-3 from each which is not enough to determine effects of different WGF Can sample all 9 Community Moblisation Officer (CMO) areas though (which cover all 3 districts)	0.25	Jerimiah Kamphasa (Lilongwe)	20	60	Added one extra to make 23
		0.25	Victoria Sande (Lilongwe)	20	60	
		0.25	Robbins Chiuta formerly Fred Mtendere (Lilongwe)	20	60	
		0.25	Abeeba Banda formerly Hellina Mwimba (Lilongwe)	20	60	
		0.33	Abigail Nyaka (Kasungu)	20	60	Added one extra to make 23
		0.33	Panji Nkhono (Kasungu)	20	60	
		0.33	Patricia (Kasungu)	20	60	
		0.5	Angela Mbawa (Salima)	20	60	
		0.5	Tissa Chalulu formerly Robbins Chiuta (Salima)	20	60	
D **WG / Village**	Randomly choose 4 WG per CMO (based on doing 5 interviews per researcher per day so one WG would be visited in one day) Random allocation by WGroupID from Access database query qryWGDetails (see sheet 'qryWGDetails') and Excel Random number generator (see sheet: 'random villages') Each of the 5 women per Women's Group (WG) are chosen by chosing random WomanID (using the Excel random number generator) from the register for that group. If the register has not been entered into the database the paper copy has to be retreived and each women on the register given a sequential numbers which are then chosen randomly in the same way (using the Random number generator).	0.25	WG 1	5		WG 1 to WG 16 are in Lilongwe
		0.25	WG 2	5		
		0.25	WG 3	5		
		0.25	WG 4	5		
		0.25	WG 5	5		
		0.25	WG 6	5		
		0.25	WG 7	5		
		0.25	WG 8	5		
		0.25	WG 9	5		
		0.25	WG 10	5		
		0.25	WG 11	5		
		0.25	WG 12	5		
		0.25	WG 13	5		
		0.25	WG 14	5		
		0.25	WG 15	5		
		0.25	WG 16	5		
		0.25	WG 17	5		WG 17 to WG 28 are in Kasungu
		0.25	WG 18	5		
		0.25	WG 19	5		
		0.25	WG 20	5		
		0.25	WG 21	5		
		0.25	WG 22	5		
		0.25	WG 23	5		
		0.25	WG 24	5		
		0.25	WG 25	5		
		0.25	WG 26	5		
		0.25	WG 27	5		
		0.25	WG 28	5		
		0.25	WG 29	5		WG 29 to WG 36 are in Salima
		0.25	WG 30	5		
		0.25	WG 31	5		
		0.25	WG 32	5		
		0.25	WG 33	5		
		0.25	WG 34	5		
		0.25	WG 35	5		
		0.25	WG 36	5		
	Choose 5 women (an equal number) from the same village (or GVH (Group Village Head) area as this is what is given in the details of the Women's Group	1	Non-WG-member Villagers from WG 1 village	5		WG 1 village to WG 16 village are in Lilongwe
		1	Non-WG-member Villagers from WG 2 village	5		

Split by	Split criteria	weight	Groups	subgroup n	Total n	Details to ensure complete / representative sample
	(see sheet 'qryWGDetails) who are not WG members (the two researchers between them can therefore cover the WG members and non-members of the same village in one day) Each of the 5 women per village (in WG villages and control villages) are randomly chosen by random walk through village stopping at every third household (given average village size of 50 Households this should ensure even distribution of interviewees) and interviewing the women in the household who has most recently celebrated her birthday.	1	Non-WG-member Villagers from WG 3 village	5		
		1	Non-WG-member Villagers from WG 4 village	5		
		1	Non-WG-member Villagers from WG 5 village	5		
		1	Non-WG-member Villagers from WG 6 village	5		
		1	Non-WG-member Villagers from WG 7 village	5		
		1	Non-WG-member Villagers from WG 8 village	5		
		1	Non-WG-member Villagers from WG 9 village	5		
		1	Non-WG-member Villagers from WG 10 village	5		
		1	Non-WG-member Villagers from WG 11 village	5		
		1	Non-WG-member Villagers from WG 12 village	5		
		1	Non-WG-member Villagers from WG 13 village	5		
		1	Non-WG-member Villagers from WG 14 village	5		
		1	Non-WG-member Villagers from WG 15 village	5		
		1	Non-WG-member Villagers from WG 16 village	5		
		1	Non-WG-member Villagers from WG 17 village	5		WG 17 village to WG 28 village are in Kasungu
		1	Non-WG-member Villagers from WG 18 village	5		
		1	Non-WG-member Villagers from WG 19 village	5		
		1	Non-WG-member Villagers from WG 20 village	5		
		1	Non-WG-member Villagers from WG 21 village	5		
		1	Non-WG-member Villagers from WG 22 village	5		
		1	Non-WG-member Villagers from WG 23 village	5		
		1	Non-WG-member Villagers from WG 24 village	5		
		1	Non-WG-member Villagers from WG 25 village	5		
		1	Non-WG-member Villagers from WG 26 village	5		
		1	Non-WG-member Villagers from WG 27 village	5		
		1	Non-WG-member Villagers from WG 28 village	5		
		1	Non-WG-member Villagers from WG 29 village	5		WG 29 village to WG 36 village are in Salima
		1	Non-WG-member Villagers from WG 30 village	5		
		1	Non-WG-member Villagers from WG 31 village	5		
		1	Non-WG-member Villagers from WG 32 village	5		
		1	Non-WG-member Villagers from WG 33 village	5		
		1	Non-WG-member Villagers from WG 34 village	5		
		1	Non-WG-member Villagers from WG 35 village	5		
		1	Non-WG-member Villagers from WG 36 village	5		
	Choose an equal number (5 women) from 36 Villages in non-WG areas (control areas). The villages should be matched by distance to Trading Centre / Main Road and District and Population Size - see sheet 'control villages' Each of the 5 women per village (in WG villages and control villages) are randomly chosen by random walk through village stopping at every third household (given average village size of 50 Households this should ensure even distribution of interviewees) and interviewing the women in the household who has most recently celebrated her birthday.	1	Women from control village 1	5		control village 1 to control village 16 are in Lilongwe
		1	Women from control village 2	5		
		1	Women from control village 3	5		
		1	Women from control village 4	5		
		1	Women from control village 5	5		
		1	Women from control village 6	5		
		1	Women from control village 7	5		
		1	Women from control village 8	5		
		1	Women from control village 9	5		
		1	Women from control village 10	5		
		1	Women from control village 11	5		
		1	Women from control village 12	5		
		1	Women from control village 13	5		
		1	Women from control village 14	5		
		1	Women from control village 15	5		
		1	Women from control village 16	5		
		1	Women from control village 17	5		control village 17 to control village 28 are in Kasungu
		1	Women from control village 18	5		
		1	Women from control village 19	5		
		1	Women from control village 20	5		
		1	Women from control village 21	5		
		1	Women from control village 22	5		
		1	Women from control village 23	5		
		1	Women from control village 24	5		
		1	Women from control village 25	5		

Split by	Split criteria	weight	Groups	subgroup n	Total n	Details to ensure complete / representative sample
		1	Women from control village 26	5		
		1	Women from control village 27	5		
		1	Women from control village 28	5		
		1	Women from control village 29	5		control village 29 to control village 36 are in Salima
		1	Women from control village 30	5		
		1	Women from control village 31	5		
		1	Women from control village 32	5		
		1	Women from control village 33	5		
		1	Women from control village 34	5		
		1	Women from control village 35	5		
		1	Women from control village 36	5		

CMO=Community Mobilisation Officer; WG=Women's Group

Map of villages (WG and control) surveyed in Salima



Map of villages (WG and control) surveyed in Kasungu

Appendix J

Budget

The following pages detail the overall budget for the study (broken down into the costs covered by the DFID grant and the cost covered by the Wellcome Trust grant), followed by detailed daily budgeting for the main study fieldwork in the 36 women's group villages and 36 control villages in Lilongwe, Kasungu and Salima districts. Please note that although the original budget anticipated the fieldwork would finish in December 2010, it finished in June 2011, within budget, all except for the fact of an unfortunate incident involving two fieldworkers taking money for work in Kasungu in February and March 2011 that they did not then complete. Instead, they handed in fake data and the whole month's work had to be redone in May 2011 at a cost of an additional £1200, which came from my personal savings.

Budget for Malawi fieldwork page 1 of 2: June 2009 to February 2010, from DFID Research Programme Consortium grant

Resource	**Purpose**									
Human Resources		***Number***	***Salary per month[a]***		***total months***		***per diem***	***total days***		***Total cost***
			MKW	**£**		**MKW**	**£**		**MKW**	**£**
Bilingual Chichewa and English speakers	Translation of WHOQoL-BREF	4	N/A		N/A	6,000	£26.79	3	72,000	£321.43
Monolingual Chichewa speakers	Validation of translation	4	N/A		N/A	1,000	£4.46	2	8,000	£35.71
Field workers	Piloting of WHOQoL-BREF	2	N/A		N/A	3,000	£13.39	30	180,000	£803.57
	Piloting and iterations of DCE	1	75,000	£334.82	4	N/A		N/A	300,000	£1,339.29
Materials		***Quantity***	***Unit cost***							***Total cost***
			MKW	**£**					MKW	£
Newspaper advertisement	Hiring of fieldworkers	1	20,000	£89.29					20,000	£89.29
Transport allowance for interviewees	Hiring of fieldworkers	5	2,000	£8.93					10,000	£44.64
Paper and printing	WHOQoL-BREF (5 pages)	500	25	£0.11					12,500	£55.80
	DCE (15 pages max.)	500	75	£0.33					37,500	£167.41
Computer	Transcription / Data Entry	1	192,470	£859.24						£859.24
Desk and Office Chair	Transcription / Data Entry	1	30,000	£133.93						£133.93
Motorbike	Travel to the field	2	757,674	£3,382.47						£6,764.95
Motorbike travel gear/equipment	Travel to the field	2	25,000	£111.61						£223.21
Servicing of Motorbike[d]	Travel to the field	6	25,000	£111.61					150,000	£669.64
		Litres of petrol per worker per day[b]	***Price per Litre***		***Field Days[c]***					***Total cost***
			MKW	**£**					MKW	£
Fuel	Travel to the field	4	213	£0.95	120				102,240	£456.43

EXCHANGE RATE: MWK per £: 224

GRAND TOTAL **£11,964.54**

[a]Includes insurance cover at equivalent of costing 15 months for every 12 months worked; i.e. multiplying the gross salary of 60,000K by 1.25

[b]Assumes up to 120km per day on motorbike at 30km per Litre fuel efficiency

[c]Assumes 15 days in the field per month per fieldworker month as outlined in the human resources section

[d]One service per 3,000km travelled where the total km travelled = 120km per fieldwork day * 120 field work days = 14,400km; Servicing costs include new tyres

Budget for Malawi fieldwork page 2 of 2: March 2010 to December 2010, from Wellcome Trust Strategic Award grant

Resource	**Purpose**									
Human Resources		***Number***	***Salary per month[a]***		***total months***	***per diem***		***total days***		***Total cost***
			MKW	**£**		**MKW**	**£**		**MKW**	**£**
Field workers	WHOQoL survey	2	60,000	£267.86	3	N/A		N/A	360,000	£1,607.14
	DCE	2	60,000	£267.86	3	N/A		N/A	360,000	£1,607.14
	Qualitative exploration of results	1	60,000	£267.86	3	N/A		N/A	180,000	£803.57
Materials		***Quantity***	***Unit cost***							***Total cost***
			MKW	**£**					MKW	£
Paper and printing	WHOQoL-BREF (5 pages)	500	25	£0.11					12,500	£55.80
	DCE (15 pages max.)	500	75	£0.33					37,500	£167.41
Servicing of Motorbike[d]	Travel to the field	9	25,000	£111.61					225,000	£1,004.46
		Litres of petrol per worker per day[b]	***Price per Litre***		***Field Days[c]***					***Total cost***
			MKW	**£**					MKW	£
Fuel	Travel to the field	4	213	£0.95	225				191,700	£855.80
EXCHANGE RATE: MWK per £: 224								GRAND TOTAL		**£6,101.34**

[a]Includes insurance cover at equivalent of costing 15 months for every 12 months worked; i.e. multiplying the gross salary of 60,000K by 1.25

[a]Assumes up to 120km per day on motorbike at 30km per Litre fuel efficiency

[b]Assumes 15 days in the field per month per fieldworker month as outlined in the human resources section

[c]One service per 3,000km travelled where the total km travelled = 120km per fieldwork day * 225 field work days = 27,000km; Servicing costs include new tyres

Week	Day	Date	District	Village no.	Lunch	Fuel	Motorbike (M) or Car (C)	WGF allowance	Women gift	Drink (D) or Soap (S)	Units	2 stroke oil	Motorbike repairs	Total
1	Monday	24/01/2011												
	Tuesday	25/01/2011	Lilongwe	WG1	1000	2700	C	500	520	D				4720
	Wednesday	26/01/2011	Lilongwe	WG2	1000	1900	M	500	500	S				3900
	Thursday	27/01/2011	Lilongwe	WG3	1000	2400	M	500	550	S	800			5250
	Friday	28/01/2011	Lilongwe	WG4	1000	2450	M	500	550	S				4500
[redacted]														
2	Monday	31/01/2011	Lilongwe	WG5	1000	8000	C	500	746	S				10246
	Tuesday	01/02/2011	Lilongwe	WG6	1000	2000	M	500	746	S	730			4976
	Wednesday	02/02/2011	Lilongwe	WG7	500	2000	M	500	746	S	320			4066
	Thursday	03/02/2011	Lilongwe	WG8	500	1800	M	500	746	S		950		4496
	Friday	04/02/2011	Lilongwe	WG9	500	2000	M	500	474	S			2700	6174
	Saturday	05/02/2011	Lilongwe	WG9	500	1600	M		271	S				2371
[redacted]														
3	Monday	07/02/2011	Lilongwe	WG10	500	1500	M	500	746	S				3246
	Tuesday	08/02/2011	Lilongwe	WG11	500	2500	M	500	250	S				3750
	Wednesday	09/02/2011	Lilongwe	WG12	1000	2000	M	500	250	S	500			4250
	Thursday	10/02/2011	Lilongwe	WG13	1000	2000	M	500	250	S				3750
	Friday	11/02/2011	Lilongwe	WG14	1000	2000	M	500	250	S				3750
[redacted]														
4	Monday	14/02/2011	Lilongwe	WG15	1000	2000	M	500	250	S	500			4250
	Tuesday	15/02/2011	Lilongwe	WG16	1000	3000	C	500	250	S				4750
													Total	**78443**

Kasungu February-March 2011 Fieldwork budget - wasted due to fieldworkers not collecting data, taking money and only providing fake data

Week	Day	Date	District	Village no.	Accomodation (500) + Food (2500)	Lunch	Fuel	Motorbike (M) or Car (C)	WGF allowance	Women gift	Drink (D) or Soap (S)	Units	2 stroke oil	Motorbike repairs	Total
	Wednesday	16/02/2011	Travel to Kasungu		4000		2500	M - Lilongwe-Kasungu							6500
	Thursday	17/02/2011	Preparing for Kasungu		4000										4000
	Friday	18/02/2011	Kasungu	WG17	6000		2000	M	500	5400	S	400	3500	500	18300
[redacted]					4000										4000
[redacted]					4000										4000
5	Monday	21/02/2011	Kasungu	WG18	6000		2000	M	500			400			8900
	Tuesday	22/02/2011	Kasungu	WG19	6000		2000	M	500			400			8900
	Wednesday	23/02/2011	Kasungu	WG20	6000		2000	M	500			400			8900
	Thursday	24/02/2011	Kasungu	WG21	6000		2000	M	500			400			8900
	Friday	25/02/2011	Kasungu	WG22	6000		2000	M	500			400			8900
[redacted]					2000	weekend to Lilongwe - travel Kasungu-Lilongwe									2000
[redacted]					2000	travel Lilongwe-Kasungu									2000
6	Monday	28/02/2011	Kasungu	WG23	6000		2000	M	500			400			8900
	Tuesday	01/03/2011	Kasungu	WG24	6000		2000	M	500			400			8900
	Wednesday	02/03/2011	Kasungu	WG25	6000		2000	M	500			400			8900
	Thursday	03/03/2011	Kasungu	WG26	6000		2000	M	500			400			8900
	Friday	04/03/2011	Kasungu	WG27	6000		2000	M	500			400			8900
[redacted]					2000	weekend to Lilongwe - travel Kasungu-Lilongwe									2000
[redacted]					2000	travel Lilongwe-Kasungu									2000
7	Monday	07/03/2011	Kasungu	WG28	6000		2000	M	500			400			8900
	Tuesday	08/03/2011	Kasungu	control17	6000		2000	M				400			8400
			Kasungu	control18											
	Wednesday	09/03/2011	Kasungu	control19	6000		2000	M				400			8400
			Kasungu	control20											
	Thursday	10/03/2011	Kasungu	control21	6000		2000	M				400			8400
			Kasungu	control22											
	Friday	11/03/2011	Kasungu	control23	6000		2000	M				400			8400
			Kasungu	control24											
[redacted]					4000										4000
[redacted]					4000										4000
8	Monday	14/03/2011	Kasungu	control25	6000		2000	M				400			8400
			Kasungu	control26											
	Tuesday	15/03/2011	Kasungu	control27	6000		4500	M - Including Kasungu-Lilongwe				400			10900
			Kasungu	control28											
	Wednesday	16/03/2011												**Total**	**203600**

Salima April 2011 fieldwork budget

Received (sign:)

Week	Day	Date	District	Village no.	Accomodation (4000) + Food (2500)	George Denja	Zione Themba	Motorbike (M) Fuel or Car (C)	Reciept	WGF allowance	Beneficiary form signed	Drink (D) or Women gift Soap (S)	Units Reciept	2 stroke oil	Receipt	repairs (arrange with MaiKhanda - receipt required)	Total
11	Monday	04/04/2011	Travel from Lilongwe to Salima		6500			2900 M				3450 S					21180
			+ planning for Salima work		6500							1830 Batteries					
	Tuesday	05/04/2011	Salima	WG29	6500			2000 M		500		900 paper	400	2000			18800
					6500												
	Wednesday	05/04/2011	Salima	WG30	6500			2000 M		500			400				15900
					6500												
	Thursday	07/04/2011	Salima	WG31	6500			2000 M		500			400				15900
					6500												
	Friday	08/04/2011	Salima	WG32	6500			2000 M		500			400				15900
					6500												
[redacted]					2000			weekend to Lilongwe - travel Salima-Lilongwe									2000
[redacted]					2000			travel Lilongwe-Salima									2000
12	Monday	11/04/2011	Salima	WG33	6500			2000 M		500			400				15900
					6500												
	Tuesday	12/04/2011	Salima	WG34	6500			2000 M		500			400				15900
					6500												
	Wednesday	13/04/2011	Salima	WG35	6500			2000 M		500			400				15900
					6500												
	Thursday	14/04/2011	Salima	WG36	6500			2000 M		500			400				15900
					6500												
	Friday	15/04/2011	Salima	control29	6500			2000 M					400				15400
			Salima	control30	6500												
[redacted]					2000			weekend to Lilongwe - travel Salima-Lilongwe									2000
[redacted]					2000			travel Lilongwe-Salima									2000
13	Monday	18/04/2011	Salima	control31	6500			2000 M					400				15400
			Salima	control32	6500												
	Tuesday	19/04/2011	Salima	control33	6500			2000 M					400				15400
			Salima	control34	6500												
	Wednesday	20/04/2011	Salima	control35	6500			2000 M					400				15400
			Salima	control36	6500												
	Thursday	21/04/2011	Travel from Salima to Lilongwe					2900 M									2900
	Friday	22/04/2011	Holiday														

Total	**223780**
Previous	128,730
Now required	95,050

Lilongwe control village fieldwork budget April-May 2011

Received (sign:)

Week	Day	Date	District	Village no.	Lunch (500 each)	George Denja	Zione Themba	Motorbike (M) Fuel or Car (C)	Reciept	WGF allowance	Beneficiary form signed	Drink (D) or Women gift Soap (S)	Units Reciept	2 stroke oil	Receipt	Motorbike repairs	Total
14	Monday	25/04/2011	Holiday														
	Tuesday	26/04/2011	Lilongwe	control1	1000			2000 M				1800 paper	400	800			7000
				control2	1000												
	Wednesday	27/04/2011	Lilongwe	control3	1000			2000 M									4000
				control4	1000												
	Thursday	28/04/2011	Lilongwe	control5	1000			2000 M					400				4400
				control6	1000												
	Friday	29/04/2011	Lilongwe	control7	1000			2000 M									4000
				control8	1000												
[redacted]																	
15	Monday	02/05/2011	Lilongwe	control9	1000			2000 M					400				4400
				control10	1000												
	Tuesday	03/05/2011	Lilongwe	control11	1000			2000 M									4000
				control12	1000												
	Wednesday	04/05/2011	Lilongwe	control13	1000			2000 M					400				4400
				control14	1000												
	Thursday	05/05/2011	Lilongwe	control15	1000			2000 M									4000
				control16	1000												

Total	**36200**
Previous	32,000
Now required	4,200

Kasungu budget - May 2011 - redoing of Feb-Mar fieldwork that was not done due to fieldworkers taking money and faking data, money came from my own personal savings

Received (sign:)

Week	Day	Date	District	Village no.	Accomodation (4000) + Food (2500)	George Denja	Zione Themba	Motorbike (M) Fuel or Car (C)	Reciept	WGF allowance	Beneficiary form signed	Drink (D) or Women gift Soap (S)	Units Reciept	2 stroke oil	Receipt	repairs (arrange with MaiKhanda - receipt required)	Total
16	Monday	09/05/2011	Travel from Lilongwe to Kasungu		6500			2900 M				5400 S					23130
			+ planning for Kasungu work		6500							1830 Batteries					
	Tuesday	10/05/2011	Kasungu	WG17	6500			2000 M		500		900 paper	400	800		5000	22600
					6500												
	Wednesday	11/05/2011	Kasungu	WG18	6500			2000 M		500			400				15900
					6500												
	Thursday	12/05/2011	Kasungu	WG19	6500			2000 M		500			400				15900
					6500												
	Friday	13/05/2011	Kasungu	WG20	6500			2000 M		500			400				15900
					6500												
[redacted]					2000			weekend to Lilongwe - travel Kasungu-Lilongwe									2000
[redacted]					2000			travel Lilongwe-Kasungu									2000
17	Monday	16/05/2011	Kasungu	WG21	6500			2000 M		500			400	800			16700
					6500												
	Tuesday	17/05/2011	Kasungu	WG22	6500			2000 M		500			400				15900
					6500												
	Wednesday	18/05/2011	Kasungu	WG23	6500			2000 M		500			400				15900
					6500												
	Thursday	19/05/2011	Kasungu	WG24	6500			2000 M		500			400				15900
					6500												
	Friday	20/05/2011	Kasungu	WG25	6500			2000 M		500			400				15900
					6500												
[redacted]					2000			weekend to Lilongwe - travel Kasungu-Lilongwe									2000
[redacted]					2000			travel Lilongwe-Kasungu									2000
18	Monday	23/05/2011	Kasungu	WG26	6500			2000 M		500			400	800			16700
					6500												
	Tuesday	24/05/2011	Kasungu	WG27	6500			2000 M		500			400				15900
					6500												
	Wednesday	25/05/2011	Kasungu	WG28	6500			2000 M		500			400				15900
					6500												
	Thursday	26/05/2011	Kasungu	control17	6500			2000 M					400				15400
			Kasungu	control18	6500												
	Friday	27/05/2011	Kasungu	control19	6500			2000 M					400				15400
			Kasungu	control20	6500												
[redacted]					2000			weekend to Lilongwe - travel Kasungu-Lilongwe									2000
[redacted]					2000			travel Lilongwe-Kasungu									2000
19	Monday	30/05/2011	Kasungu	control21	6500			2000 M					400	800			16200
			Kasungu	control22	6500												
	Tuesday	31/05/2011	Kasungu	control23	6500			2000 M					400				15400
			Kasungu	control24	6500												
	Wednesday	01/06/2011	Kasungu	control25	6500			2000 M					400				15400
			Kasungu	control26	6500												
	Thursday	02/06/2011	Kasungu	control27	6500			2000 M					400				15400
			Kasungu	control28	6500												
	Friday	03/06/2011	Travel from Kasungu to Lilongwe					2900 M									2900
																Total	**330330**

Appendix K

Adaptation of data collection instruments for collection using PDAs

What follows is a complete reproduction of the on-PDA-screen visualisation of the forms for all four parts of the study: the WHOQoL-BREF study (QoL, see §4), the best-worst scaling discrete choice experiment study (BWS, see §6), the importance questions (Imp, see §6.5), and the contingent valuation study (CV, see §7).

The coding was designed primarily to ensure accurate data collection including appropriate skip patterns between questions and only allowing the interviewer to enter valid answers to specific questions. Before showing the PDA-screenshots, specific examples of the coding are as follows:

Validation rules for dates of birth (over 18):

```
exitscreen:
temp = answer / 86400 {convert to days}
if temp > 32619 then
  msgbox "Must be before 23/04/1993; respondent has to be at least 18 years old"
  goto [dob]
return
endif
if $[dob] == null then msgbox "Must enter dob. Note rough dob if necessary."
  goto [dob]
  return
endif
```

Ensuring the field for entering specifics is only activated if the answer to the previous question on the presence of the specific thing is yes e.g. for "are you currently Ill?" (Yes [Eya] or No [Ayi]), followed by "if yes, state illness":

Ill field:

exitscreen:
if $[ill] == null then
msgbox "Must complete field"
goto [ill]
return
endif
select:
{for skips on the same page, it's necessary to use readwrite and readonly instead of show / hide}
if answer == "1 Eya" then
readwrite [illness]
else
readonly [illness]
$[illness] = null
endif

Illness field:

exitscreen:
if $[ill] == Y then
if $[illness] == null then
msgbox "Must complete field"
goto [ill]
return
endif
endif

1-5 scales for QoL and Imp questions: see screenshots 11-41 and 50-76 below, respectively.

Validation rules for BWS DCE: only numbers 1-81 could be entered, the same scenario number could not be entered in two different choice fields and scenario 76 always had to be entered:

for fields bw1-bw7: MinValue: 1 MaxValue: 81

bw1 field:

exitscreen:
if $[bw1] == null then
msgbox "Must complete all fields."
goto [bw1]
return
endif
temp = 0
if $[bw1] = $[bw2] then temp = 1 endif
if $[bw1] = $[bw3] then temp = 1 endif
if $[bw1] = $[bw4] then temp = 1 endif

```
    if $[bw1] = $[bw5] then temp = 1 endif
    if $[bw1] = $[bw6] then temp = 1 endif
    if $[bw1] = $[bw7] then temp = 1 endif
    if temp = 1 then
      msgbox "Must not select same answer twice"
      goto [bw1]
    endif
```

bw2 field:

```
    exitscreen:
    if $[bw2] == null then
      msgbox "Must complete all fields."
      goto [bw2]
      return
    endif
    temp = 0
    if $[bw2] = $[bw3] then temp = 1 endif
    if $[bw2] = $[bw4] then temp = 1 endif
    if $[bw2] = $[bw5] then temp = 1 endif
    if $[bw2] = $[bw6] then temp = 1 endif
    if $[bw2] = $[bw7] then temp = 1 endif
    if temp = 1 then
      msgbox "Must not select same answer twice"
      goto [bw2]
    endif
```

bw3 field:

```
    exitscreen:
    if $[bw3] == null then
      msgbox "Must complete all fields."
      goto [bw3]
      return
    endif
    temp = 0
    if $[bw3] = $[bw4] then temp = 1 endif
    if $[bw3] = $[bw5] then temp = 1 endif
    if $[bw3] = $[bw6] then temp = 1 endif
    if $[bw3] = $[bw7] then
       temp = 1 endif if temp = 1 then msgbox "Must not select same answer
twice"
      goto [bw3]
    endif
```

bw4 field:

```
  exitscreen:
  if $[bw4] == null then
    msgbox "Must complete all fields."
    goto [bw4]
    return
  endif
  temp = 0
  if $[bw4] = $[bw5] then temp = 1 endif
  if $[bw4] = $[bw6] then temp = 1 endif
  if $[bw4] = $[bw7] then temp = 1 endif
  if temp = 1 then
    msgbox "Must not select same answer twice"
    goto [bw4]
  endif
```

bw5 field:

```
  exitscreen:
  if $[bw5] == null then
    msgbox "Must complete all fields."
    goto [bw5]
    return
  endif
  temp = 0
  if $[bw5] = $[bw6] then temp = 1 endif
  if $[bw5] = $[bw7] then temp = 1 endif
  if temp = 1 then
    msgbox "Must not select same answer twice"
    goto [bw5]
  endif
```

bw6 field:

```
  exitscreen:
  if $[bw6] == null then
    msgbox "Must complete all fields."
    goto [bw6]
    return
  endif
  temp = 0
  if $[bw6] = $[bw7] then temp = 1 endif
  if temp = 1 then
    msgbox "Must not select same answer twice"
    goto [bw6]
  endif
```

bw7 field:

```
exitscreen:
if $[bw7] == null then
  msgbox "Must complete all fields."
  goto [bw7]
  return
endif
temp = 0
if $[bw1] = 76 then temp = 1 endif
if $[bw2] = 76 then temp = 1 endif
if $[bw3] = 76 then temp = 1 endif
if $[bw4] = 76 then temp = 1 endif
if $[bw5] = 76 then temp = 1 endif
if $[bw6] = 76 then temp = 1 endif
if $[bw7] = 76 then temp = 1 endif
if temp <> 1 then
  msgbox "Must choose card 76 for one answer"
  goto [bw7]
endif
```

Skip rules for paying in either money (questions E15-E18), time (questions E19-E20) or maize flour (ufa; questions E21-E22) in the contingent valuation study:

```
exitscreen:
if $[E14] == null then
  msgbox "Must complete field"
  goto [E14]
  return
endif
select:
left answer 1
if result = 1 then
  show from [E15] to [E18]
  hide from [E19] to [E22]
  nullfrom [E19] to [E22]
else
  if result = 2 then
    hide from [E15] to [E18]
    nullfrom [E15] to [E18]
    show from [E19] to [E20]
    hide from [E21] to [E22]
    nullfrom [E21] to [E22]
else
```

```
  if result = 3 then
    hide from [E15] to [E18]
    nullfrom [E15] to [E18]
    hide from [E19] to [E20]
    nullfrom [E19] to [E20]
    show from [E21] to [E22]
  endif
 endif
endif
```

Limits for entering money, time (hours) and ufa (kg) for itemised CV study e.g. for time:

```
exitscreen:
if $[E19G] == null then
  msgbox "Must complete all fields. Write -9 if don't know"
  goto [E19G]
  return
endif
temp = -9
if $[E19G] <> temp then
  if $[E19G] < 0 then
    msgbox "Can't be less than 0"
    goto [E19G]
  endif
endif
buffer = 0
if $[E19A] > 0 then
  buffer = buffer + $[E19A]
endif
if $[E19B] > 0 then
  buffer = buffer + $[E19B]
endif
if $[E19C] > 0 then
  buffer = buffer + $[E19C]
endif
if $[E19D] > 0 then
  buffer = buffer + $[E19D]
endif
if $[E19E] > 0 then
  buffer = buffer + $[E19E]
endif
if $[E19F] > 0 then
  buffer = buffer + $[E19F]
```

```
endif if $[E19G] > 0 then
  buffer = buffer + $[E19G]
endif
$[E19H] = buffer
if buffer > 168 then
  msgbox "There are only 168 hours in a week. Go back and check answers"
  goto [E19A]
  return
endif
```

Visualisation of WTP in CV study (the first message box comes up as a scale from 0 to the cumulative total of the previous questions on individual expenditure (in this case field E17)):

```
enterscreen:
buffer = "0....................." & $[E17]
msgbox buffer
exitscreen:
if $[E18] == null then
  msgbox "Must complete field"
  goto [E18]
  return
endif
temp = -9
if $[E18] <> temp then
  if $[E18] > 0 then
    if answer < $[E17] then
      return {OK}
    endif
  endif
  msgbox "Can't be more than total expenditure"
  goto [E18]
endif
```

WHOQoL-BREF Quality of Life 1

This is the WHOQoL-BREF Quality of Life questionnaire. If you do not want to conduct an interview with this form please press QUIT.

QUIT

ID number .....

Category of woman:

..... Lookup...

Tap to record start time

☑

Previous Next

Tikudziweni 2

Musanayambe, tikadakonda mutayankha mafunso pang'ono okhudzana ndi inu: pozunguliza yankho lolondola kapena polemba yankholo m'mizere yotsatilayi.

Kodi tsiku lanu lakubadwa ndiliti?

- Set Date -

Previous Next

Respondent Characteristics 3

Kodi munafika pati ndi maphunziro anu?

..... Lookup...

Kodi muli pabanja?

..... Lookup...

Previous Next

Currently ill? 4

Kodi panopa mukudwala?

..... Lookup...

Ngati muli ndi vuto la umoyo mukuganiza kuti ndichani?

.....

.....

Previous Next

Malangizo 5

Mafunso otsatilawa akufuna kudziwa za zomwe mukumvera zokhudzana ndi kupambana kwa moyo wanu, umoyo kapena zinthu zina zokhudza moyo wanu. Chonde yankhani mafunso onse. Ngati mukukayikira yankho limene mukufuna mupereke, chonde sankhani lomwe likuwoneka

Previous Next

Malangizo 6

ngati lokhonza. Nthawi zambiri yankholi limakhala lomwe munaliganizila poyamba.

Chonde kumbukirani mulingo omwe mumadziyika, ziyembekezo zanu, zomwe zimakusanagalatsani, ndi nkhawa zanu.

Previous Next

Malangizo 7

Tikufunsani kuti muganizire za moyo wanu m'sabata ziwiri zapitazi. Mwachitsanzo, poganizira masabata awiri apitawa, mukhonza kufunsidwa:

Previous Next

Malangizo 8

Kodi mumalandira chinthandizo choyenera chimene mumafuna kuchokera kwa anthu ena?
1=Ayi 2 =Pang'ono 3=Pakatikati
4=Kwambiri 5=Chonse

1	2	3	4	5

Previous Next

Malangizo 9

Muzungulize nambala yomwe ikulongosola bwino kuchuluka kwa chithandizo chomwe munalandira kuchokera kwa anthu ena m'sabata ziwiri zapitazi. Choncho munakazungi nambala 4 ngati munalandira chithandizo kwambiri kuchokera kwa anzanu ena motere. [circle 4]

Previous Next

Malangizo 10

Munakazunguliza nambala 1 ngati simunalandire chithandizo chilichonse chomwe munafuna kuchokera kwa anthu ena m'sabata ziwiri zapitazi. [go back 2 pages and circle 1 on the question]
Chonde werengani funso lililonse, ganizilani za malingaliro anu ndipo zungulizani namabala pa mulingo omwe yankho lolondola kwa inuyo layikidwa pa funso lililonse.

Previous Next

The WHOQoL-BREF 11

1. Mukaziona, moyo wanu ndiwapambana bwanji?
Read out options:
1=Sulibwino kwambiri 2=Sulibwino
3=Uli pakatikati 4=Ulibwino
5=Ulibwino kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 12

2. Kodi ndinu okhutira bwanji ndi umoyo wanu?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsdwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 13

Mafunso otsatilawa akufunsa za mulingo wa zina zomwe mwakumana nazo m'sabata ziwiri zapitazi.

Previous Next

The WHOQoL-BREF 14

3. Mukuona ngati kuwawa kwa mthupi kwanu kwakulepheretsani bwanji kuchita zomwe mumafuna kuchita?
Read out options:
1=Palibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 15

4. Kodi mumafuna chithandizo cha chipatala chochuluka bwanji kuti muchite zofunika kuchita tsiku ndi tsiku?
Read out options:
1=Palibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 16

5. Kodi mumasangalala kwambiri bwanji ndi moyo?
Read out options:
1=Palibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 17

6. Kodi mukuganiza kuti moyo wanu ndi watanthauzo motani?
Read out options:
1=Palibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 18

7. M'makhala ndi chidwi (chomvetsera) choyenera bwanji pakuchita zinthu?
Read out options:
1=Ayi/Palibe 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 19

8. Kodi mumaona kuti ndinu otetezedwa bwanji pa moyo wanu wa tsiku ndi tsiku?
Read out options:
1=Ayi/Palibe 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 20

9. Kodi malo amene mumapezeka kapena kukhala kawirikawiri ndi abwino bwanji ku umoyo wanu?
Read out options:
1=Ayi/Palibe 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 21

Mafunso otsatilawa akufuna kudziwa kuti mwakwanitsa bwanji komanso munatha bwanji kuchita zina ndi zina m'sabata ziwiri zapitazi.

Previous Next

The WHOQoL-BREF 22

10. Kodi muli ndi mphamvu zokwanira zochitila zinthu tsiku ndi tsiku?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 23

11. Kodi mutha kuvomereza m'mene maonekedwe anu alili?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 24

12. Kodi mumakhala ndi ndalama zokwanira kuti mukwanitse zofunikira?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 25

13. Kodi muli ndi mwayi otani wotha kupeza zinthu zokuphunzitsani zimene mumafuna pa moyo wanu?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 26

14. Kodi muli ndi mwayi wotani wochita zinthu za nsangulutso?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 27

27. Kodi mumakhala ndi chakudya chokwanira kudyetsa banaja lanu?
Read out options:
1=Tilibe/Ayi 2=Pang'ono
3=Pakatikati 4=Kwambiri
5=Kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 28

15. Kodi ndikophweka bwanji kwa inuyo kutha kuyendayenda?
Read out options:
1=Ndikovuta kwambiri 2=Ndikovuta
3=Pakatikati 4=Ndikophweka
5=Ndikophweka kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 29

Mafunso otsatiliwa akufuna kudziwa m'mene mwamvera ubwino kapena m'mene mwakhutitsidwira ndizochitika zosiyanasiyana za moyo wanu m'sabata ziwiri zapitazi

Previous Next

The WHOQoL-BREF 30

16. Kodi ndinu okhutitsidwa bwanji ndi tulo timene mumapeza mukagona?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 31

17. Ndinu okhutitsidwa bwanji ndi m'mene mungakwanilitsire kugwira ntchito zanu za tsiku ndi tsiku?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 32

18. Kodi mumakhutitsidwa bwanji ndi m'mene mumangakwanilitsire kugwira ntchito?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 33

19. Kodi ndinu okhutitsidwa bwanji ndinu mwini?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 34

20. Ndinu okhutitsidwa bwanji ndi m'mene ubale wanu ulili ndi anthu ena?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 35

21. Ndinu okhutitsidwa bwanji ndi moyo wanu ogonana ndi achikondi anu?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 36

22. Ndinu okhutitsidwa bwanji ndi chithandizo chomwe mumalandira kuchokera kwa anzanu?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1	2	3	4	5

Previous Next

The WHOQoL-BREF 37

23. Ndinu okhutitsidwa bwanji ndi m'mene malo anu mumakhala alili?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1 | 2 | 3 | 4 | 5

Previous Next

The WHOQoL-BREF 38

24. Muli okhutira bwanji ndi kupezeka kwa chithandizo cha za umoyo?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1 | 2 | 3 | 4 | 5

Previous Next

The WHOQoL-BREF 39

25. Muli okhutitsidwa bwanji ndi zokhudza ndi mayendedwe (tharasipoti)?
Read out options:
1=Osakhutitsidwa kwambiri
2=Osakhutitsidwa 3=Pakatikati
4=Okhutitsidwa
5=Okhutitsidwa kwambiri

1 | 2 | 3 | 4 | 5

Previous Next

The WHOQoL-BREF 40

Funso lotsatilalri likukhudzana ndi m'mene mwamvera kapena kudutsana ndi zinthu zina kawirikawiri bwanji m'sabata ziwiri zapitazi.

Previous Next

The WHOQoL-BREF 41

26. Kodi ndi kawirikawiri bwanji pomwe mumakhala osakondwa monga kukhala a chisoni, otaya mtima, odandauladandaula, kapena okhumudwa? Read out options:
1=Sizinachitikepo
2=Mwapatalipatali 3=Kawirikawiri
4=Kawirikawiri kwambiri
5=Nthawi zonse

1 | 2 | 3 | 4 | 5

Previous Next

The WHOQoL-BREF 42

Kodi alipo anakuthandizani kuyankha mafunsowa?

Yes | No

Tap to record endtime
☑

Previous Next

The WHOQoL-BREF 43

Kodi muli ndi ndemanga iliyonse yokhudzana ndi mafunsowa?
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Previous Next

The WHOQoL-BREF 44

Zikomo kwambiri pakutenga mbali kwanu

END OF WHOQoL-BREF

Go to the next screen to record results of Best-Worst study...

Tap to record start time of B-W
☑

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Best-Worst Study 45

Rank	Card Number
1 (Best)	.....
2 (2nd Best)	.....
3 (3rd Best)	.....
4	.....
5 (3rd Worst)	.....
6 (2nd Worst)	.....
7 (Worst)	.....

Tap to record endtime of B-W
☑

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Importance Questions or CV? 46

To do Importance questions click 'Go to Importance'
Go To Importance

To do the Contingent Valuation study click 'Go To CV Study'
Go To CV Study
To do neither and finish for this respondent click 'End'
End

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Importance Questions 47

Tap to record start time of Importance questions
☑

Mafunso otsatirawa akufunsa kufunikira kwa zinthu zina zomwe zimakhudza moyo wanu. Tikufunsani kuti mutiwuze momwe zinthu zimenezi zimakhudzira moyo wanu.Mwachitsanzo funso lina likufunsa kufunikira kwa tulo pa moyo wanu. Ngati tulo sitofunikira kwa inuyo

Previous Next

Importance Questions 48

chongani nambala yayandikana ndi mawu oti 'osafunikira'. Ngati tulo nditofunikira kwambiri kwa inuyo chongani nambala yayandikana ndi mawu oti 'ofunikira kwambiri'. Kusiyamitsa mafunso a mbuyomu, mafunso awa sakutengera masabata awiri ambuyomu okha ayi.

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Importance Questions 49

Zikomo chifukwa cha thandizo lanu.

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The WHOQoL-BREF 50

Imp1. Kwenikweni moyo wanu ndi wapamwamba bwanji?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 51

Imp2. Umoyo wanu ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 52

Imp3. Kukhala mfulu ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 53

Imp4. Kukhala moyo osadalira mankhwala kapena chithandizo cha za umoyo ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 54

Imp5. Kukhala moyo okondwera ndi wosangalala ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 55

Imp6. Ndikofunikira bwanji kumva kuti moyo wanu ndiwofunikira?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 56

Imp7. Kukhala ndi chidwi chomvetsera ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 57

Imp8. Kukhala otetezedwa ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 58

Imp9. Mmene malo amene mumakhala aliri ndiofunikira bwanji kwa inuyo (monga kuonongeka kwa mpweya, nyengo, phokoso, kuwoneka bwino?
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 59

Imp10. Kukhala ndi mphamvu ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 60

Imp11. Maonekedwa a thupi lanu ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 61

Imp12. Mapezedwe a ndalama ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 62

Imp13. Mwayi wotha kupeza zinthu zokuphunzitsani ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 63

Imp14. Kukhala ndi nthawi yopumula/yosangalala ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 64

Imp27. Kukhala ndi chakudya chokwanira ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 65

Imp15. Kukwanitsa kuyendayenda ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 66

Imp16. Kukhala ndi tulo tokwanira ndikupuma nkofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 67

Imp17. Nkofunikira bwanji kukwaniritsa kugwira ntchito zanu za tsiku ndi tsiku (monga kuchapa, kuvala, kudya)?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 68

Imp18. Kutha kugwira ntchito ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 69

Imp19. Kukhala ndi malingaliro a bwino pa moyo wanu ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 70

Imp20. Ubale wabwino ndi anthu ena ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 71

Imp21. Moyo wogonana ndi a chikondi anu ndiofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 72

Imp22. Thandizo lochokera kwa anthu ena ndilofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1 2 3 4 5

Previous Next

The WHOQoL-BREF 73

Imp23. Za momwe pakhomo panu paliri ndizofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 74

Imp24. Kukwaniritsa kupeza chithandizo cha za umoyo chokwanira ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1	2	3	4	5

Previous Next

A Screening Questions 79

A1 Kodi mudamvapo za magulu a amayi a MaiKhanda?

Yes	No

Previous Next

A Screening Questions 80

A2 Kodi mudayamba mwakhalapo pa msonkhano wa gulu la amayi a MaiKhanda?

Yes	No

Previous Next

The WHOQoL-BREF 75

Imp25. Kukhala ndi mayendedwe okwanira mmoyo wanu wa tsiku ndi tsiku ndikofunikira bwanji kwa inuyo?
Read out options:
1=Osafunikira
2=Ofunikira pang'ono
3=Ofunikira pakati mpakati
4=Ofunikira kwambiri
5=Ofunikira kwambiri zedi

1	2	3	4	5

Previous Next

The WHOQoL-BREF 76

Imp26. Kukhala moyo osakonda kukhala osakondwa monga kukhala a chisoni, otaya mtima, odandauladandaula, kapena okhumudwa ndikofunikira bwanji pa moyo wanu?
Read out options from previous page.

1	2	3	4	5

Previous Next

B Background relating to WGs 81

B3 Mukudziwapo wina aliyense amene ali mgululi?

Yes	No

Previous Next

B Background relating to WGs 82

B4 Kodi mwasonkhanapo kangati mmagulu a amayi?
Write -9 if don't know

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

Importance Questions 77

Tap to record endtime of Importance
☑

This is the end of the Importance questions. Tap 'Next' to finish interviewing this respondent.

Previous Next

Contingent Valuation 78

Tap to record start time of CV
☑

Kodi gulu la MaiKhanda ndi lofunikira bwanji kwa inu?

Previous Next

B Background relating to WGs 83

B5 Mganizo anu ndi otani pa magulu a amayiwa? Probe for positive/negative attitudes.

.....
.....
.....
.....
.....
.....
.....
.....

Previous Next

B Background relating to WGs 84

B6a Mukuganiza kuti pali phindu lina la magulu a amayi lomwe simunalitchule kale? Ngati Eya, Tchulani

Yes	No

B6b Ngati Eya, Phindu lake ndi loti:

.....
.....
.....
.....
.....
.....

Previous Next

B Background relating to WGs 85

B7a Mukuganiza kuti pali maavuto amene mukuwaona ndi Magulu a amayiwa amene simunatchule kale? Ngati Eya, Ndi mavuto ati?

Yes | No

B7b Ngati Eya, Mavutowa ndi awa:

.....

.....

.....

.....

.....

Previous Next

B Background relating to WGs 86

B8 Mukuganiza kuti pamafunika ndalama zochuluka bwanji kuyendetsera gulu limodzi la amayi mu mwezi umodzi (Kwacha)?
Write -9 if don't know

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

C Mafunso okhudza mbiri ya mun 87

C9 Mumatha kuwerenga ndi kulemba?

..... Lookup...

Previous Next

C Mafunso okhudza mbiri ya mun 88

C10a Mukuganiza kuti imfa za amayi ndi ana pochembeza ndi zochuluka kapena ndi zochepa?

..... Lookup...

C10b Chifukwa chani?

.....

.....

.....

.....

.....

.....

Previous Next

C Mafunso okhudza mbiri ya mun 89

C11 Munapita kusikelo kangati musanachire mimba yanu yomaliza?
Write -1 if never pregnant.
Write -9 if don't know.

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

C Mafunso okhudza mbiri ya mun 90

C12 Kodi munakaberekera kuti?

..... Lookup...

Previous Next

D Description of study/scenario 91

Magulu a amayi a MaiKhanda makumana pafupipafupi kukambrana mavuto amene amyi amakumana nawo pochembeza. Gulu lililonse mumakhala anthu khumi kufikira makumi atatu Maguluwa amakumana kasanu ndi katatu kukambirana mavuto amene amakumana nawo andi njira ..

Previous Next

D Description of study/scenario 92

zothetsera mavutowa. Njirazi zimatsatidwa ndi kuwunikidwa ndi maguluwa. Zikatero maguluwa amayambiranso kukumana, kugwiritsa ntchito njira zomwe akambirana komanso kuwunikanso njirazo.

Previous Next

D Description of study/scenario 93

Ntchito ya magulu a amayiwa ikuyendetsedwa ndi MaiKhanda kufikira January 2012 pamene thandizo la ndalama lidzathere. Pa nthawi iyi ntchitoyi mwina idzakhala mmanja mwa anthu a kumudzi omwe adzidzaperekathandizo al ndalama zoyendetsera ntchitoyo.

Previous Next

D Description of study/scenario 94

Anthu azidzasankha kupereka nthawi yawo, zokolola kapena ndalama zawo poyendetsa magulu a amayiwa chifukwa choti maguluwa akuwapindulira iwowo kapena akupindulira anthu a mdera lawo. Kapena anthu sadzafuna kupereka nthawi yawo, zokolola kapena ndalama ..

Previous Next

D Description of study/scenario 95

zawo poyendetsa magulu a amayiwa chifukwa choti maguluwa sakuwapindulira iwowo kapena phindu lake ndiloochepa kwambiri kuti lifune thandizo koposa kugwiritsa ntchito nthawi yawo, ndalama zawo kupangira zinthu zina zomwe iwo akufuna.

Previous Next

D Description of study/scenario 96

Kanthito aka nkofuna kudziwa ngati magulu a amayi a MaiKhanda ndiofunikira kwa inu

Chiganizo mupange chikuyenera kulingana ndi mapezedwe anu a ndalama pakadali pano (ndalama zomwe mungakwanitse kupereka).

Previous Next

D Description of study/scenario 97

D13 Ngati nzika ya dera lino mukakonde kupereka ndalama, ufa kapena kupeza nthawi yopanga nawo zochitikachitika za magulu a amayi kuti maguluwa apitirire mu chaka cha 2012?

Yes	No

Previous Next

E Tsatanetsane wa kalipiridwe 98

E14 Mungakonde kupereka chain mwa izi:

..... Lookup...

Previous Next

E Tsatanetsane wa kalipiridwe 99

Ndalama:
Poyamba ndikufuna ndikufunseni za ndalama zomwe mumagwiritsa ntchito pa zinthu zina.
E15 Munagwiritsa ndalama zochuluka bwanji mwezi wathawu pakhomo panu pa zinthu izi?
(Tap Next for detailed questions.
Write amounts in whole Kwacha)

Previous Next

E Tsatanetsane wa kalipiridwe 100

E15A chakudya (monga nsima, ndiwo, mchere, shuga, mafuta ophikira)?

.....

E15B zipangizo zaulimi (feteleza)?

.....

E15C rendi? .....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 101

E15D mayendedwe? .....
E15E maphunziro? .....
E15F thandiza la za umoyo?

.....

E15G zochitikachitika mmudzi?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 102

E15H zinthu zina (monga zovala, ziweto, zakudya zina)?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 103

E15I Kuwonkhetsa ndalama zonse

.....

E16 Katundu amene munapeza wa pa khomo panu posinthanitsa ndi katundu wina ndi wookwana ndalama zingati?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 104

E17 Kuwonkhetsa ndalama ndi mtengo wa katundu

.....

Previous Next

E Tsatanetsane wa kalipiridwe 105

Ndalama zomwe munene kuti mungakwanitse kupereka ku magulu a amayi a Maikhanda zikhale ndalama zomwe mungathe kupereka polingalira kuti pali zinthu zina zomwe mukafune kugwiritsira ntchito ndalama zanu.e. Ndalama zoti mukapereka ku gulu la a amayi ..

Previous Next

E Tsatanetsane wa kalipiridwe 106

simungazifunenso kugwiritsira ntchito pa zinthu zina zomwe mwatchula pamwambazi

E18 Pogwiritsa ntchito malangizo ali mmunsiwa...

Previous Next

E Tsatanetsane wa kalipiridwe 107

E18 Ndi ndalama zingati zomwe mungakonde kumapereka mwezi ndi mwezi zoyendetsera magulu a amayi kuti apitirirebe chaka cha 2012?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 108

Nthawi:
Choyamba ndikufuna ndikufunseni nthawi imene mumakhala nayo kuchita zinthu zina.
E19 Zinthu zotsatirazi zinakudyerani nthawi yochuluka bwanji?
(Tap Next for detailed questions; write all amounts in whole Hours)

Previous Next

E Tsatanetsane wa kalipiridwe 109

E19A Kuphika?

.....

E19B Kukonza pakhomo?

.....

E19C Kusamalira ana?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 110

E19D Ntchito zina za pakhomo (monga kutunga madzi)?

.....

E19E Ulimi?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 111

E19F Ntchito zina (monga yolelmbedwa)?

.....

E19G Zochitikachitika za mmudzi?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 112

E19H Kuwonkhetsa ndalama zonse

.....

Previous Next

E Tsatanetsane wa kalipiridwe 113

Kuchuluka kwa nthawi yomwei mungakwanitse kupezeka pa zochitika za magulu a amayi a Maikhanda ikhale nthawi yomwe mungathe kupezeka polingalira kuti pali zinthu zina zomwe zingafune nthawi yanunso monga mwanenera pamwambapa

Previous Next

E Tsatanetsane wa kalipiridwe 114

E20 Pogwiritsa ntchito malangizo ali mmunsiwa...

Previous Next

E Tsatanetsane wa kalipiridwe 115

E20 Munganene kuti ndi nthawi yochuluka bwanji imene mungakwanitse kupezeka pa zochitikachitika za magulu a amyi sabata ndi sabata kuti magulu a amayi apitirirebe chaka cha 2012?

.....

Previous Next

E Tsatanetsane wa kalipiridwe 116

Ufa wa chimanga:
Poyamba ndikufuna ndikufunseni za kuchuluka kwa ufa womwe mumagwiritsa ntchito pa zinthu zina.
E21 Kodi munagwiritsa ntchito ufa wochuluka bwanji pa khomo panu mwezi wathawu?

Previous Next

E Tsatanetsane wa kalipiridwe 117

E21A kudyetsa anthu a pakhomo panu?

.....

E21B kudyetsa anthu ena?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 118

E21C Kugulitsa kwa anthu ena?

.....

E21D Kupatsa athu ena (monga posinthana ndi chinthu china)?

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

E Tsatanetsane wa kalipiridwe 119

E21E Kuwonkhetsa ufa onse munagwiritsa ntchito mwezi wathawu

.....

Previous Next

E Tsatanetsane wa kalipiridwe 120

Kuchuluka kwa ufa umene mungakwanitse kupereka ku magulu a amayi a Maikhanda ukhale womwe mungathe kupereka polingalira kuti pali ntchito zina zomwe mungafune kugwiritsa ntchito ufawo monga mwanenera pamwambapa

Previous Next

E Tsatanetsane wa kalipiridwe 121

E22 Pogwiritsa ntchito malangizo ali mmunsiwa...

Munganene kuti ndi ufa wochuluka bwanji umene mungakwanitse kupereka ku magulu a amyi mwezi ndi mwezi kuti magulu...

Previous Next

E Tsatanetsane wa kalipiridwe 122

E22 ..a amayi apitirirebe chaka cha 2012? Ufawu utha kudzagwiritsidwa ndi maguluwa kapena kugulitsidwa ndi cholinga chofuna kupezera zinthu zina zosoweka pa gulupo.

.....

+-	7	8	9
Del	4	5	6
00	1	2	3
	000	0	.

Previous Next

QoL B-W Imp CV v6 127

Finish the interview? (press 'Yes' and then 'Next' to finish interview)

Yes | No

Previous Next

F Zolinga za mayankho anu 123

F23 Mwavomera kuti mutha kulipirako kanthu. Ndi chifukwa chani mwapanga chiganizo chimenechi? Probe for health and non-health benefits. Also probe for existence value, option value and altruism if positive WTP.

.....

.....

.....

.....

.....

Previous Next

F Zolinga za mayankho anu 124

F24a Kodi munali ndi vuto kuyankha funso lokhudzana ndi zomwe mungathe kupereka?

Yes | No

F24b Ngati eya, ndi vuto lanji:

.....

.....

.....

.....

.....

.....

Previous Next

F Zolinga za mayankho anu 125

F25 . Mwasankha kusapereka kanthu kali konse, chifukwa chani mwaganiza choncho? Probe for inability to pay or negative aspects of women's groups

.....

.....

.....

.....

.....

.....

Previous Next

Contingent Valuation 126

Tap to record end time of CV

☑

This is the end of the Contingent Valuation questionnaire to finish collecting data for this respondent, go to the next screen an click 'Yes' on the 'Finish interview question'.

Previous Next

Appendix L

Focus Group Discussions protocol

Centre for International Health & Development	*NHSRC Protocol # 420* *UCL Protocol #*
Approval: Prof. Anthony Costello	*Effective Date:* July, 2009
Title: Principal Investigator	*Date:* 14th July, 2009
Study Title: A study on the effect of supply and demand side interventions on maternal and neonatal mortality in three districts in Malawi, Africa	
Procedure Title: Implementing the Woman's Group members Focus Group Discussion	

Experiences of being in a Woman's Group - Protocol

Aim:

To understand the MaiKhanda Woman's Groups from the perspective of their members.

Purpose:

To analyse the experiences and opinions of women who attend Women's Groups for the individual / societal perspective of the economic evaluation as well as for the process evaluation.

Objectives:

- To understand the experience of women attending women's groups.
- To determine their understanding/perception of the benefits of women's groups.
- To elicit the opinions of the women regarding the different attributes[1] of women's groups and how important they are.
- To explore the opinions of the women regarding how the women's groups may affect different aspects of quality of life.

Responsibility

The Community Mobilisation Officers (CMO) will be primarily responsible for arranging the meetings with the women's group members. The discussions will be facilitated by the M&E officer who is trained in FGD facilitation. A second MEO will be responsible for note taking and recording.

Method:

Focus Group Discussions (FGD) to collect of information on the experiences of the woman attending WG. Guidelines for the FGD (see pages 5-7) will be translated from English into Chichewa. The FGD will be conducted in Chichewa.

[1] An aspect or part of the Women's Group that could either be something that is necessary for the WG to function (e.g. the time the women use for WG activities or money that given to the group) something that the WG does (e.g. grow dimba gardens, lobby for provision of bicycle ambulances) or something that results from the WG (e.g. better maternal or neonatal health).

Sample

A purposive sample of six FGD, two in each of the three MaiKhanda districts, each containing approximately 10 women from the same or neighbouring WG. Should significant heterogeneity present in the data, this sample may be increased.

Data Collection:

Each FGD will be facilitated by two MEO, one of whom will be responsible for tape recording the FGD and also writing notes to record what is being said and observed; the other of whom will be responsible for facilitating the group in a manner enabling all participants to contribute to the discussions.

The MEO have already been trained in conducting FGD by Mikey Rosato (MaiMwana Technical Advisor) at the M&E quarterly meeting in September 2007. Refresher training will be arranged for the MEO prior to conducting the pilot FGD. Notes detailing good practice of FGD (from the FHI qualitative research manual) will be provided to the MEO conducting the FGD.

The MEO should liaise with the CMO to arrange suitable dates and times and places for conducting the FGD with the women. As such the women should be informed in advance (either by the MEO or the CMO) of when and where the FGD will take place.

The MEO in charge of recording the FGD must check for adequate battery charge and memory in the recorder prior to leaving the office for the FGD.

Individual written consent from each member of the FGD should be obtained prior to conducting the FGD. The consent form is printed on page 4 of this protocol. The FGD will be conducted using a voice recorder (Sony digital recorder version 3.0). Separate consent must be obtained for the use of voice recorders (also see page 4). In order to ensure that what the participants say remains confidential, during transcription each participant will be assigned a number for use in analysis.

Before the start of the FGD ground rules should be established which seek to remind participants that what will be discussed will be confidential, as well as prevent individuals from interrupting each other or from being disrespectful to each other. The FGD will be conducted in suitable facilities (a closed room) to ensure privacy.

Both the moderator and the note-taker for the FGD should be familiar with their roles. It may be helpful for them both to consult the checklist in the FHI qualitative research guide too.

After completion of the FGD the digital file should be downloaded on to the M&E computers in the respective district offices and stored in a new folder named 'WG FGD'09'. The document should be named based on the FGD date and initials of the facilitator. *Eg: If the FGD was facilitated on the 17-Aug'09 by Austin Bondo, the document should be stored in the computer as* '20090817-AB'. The files will then be collected by Tim Colbourn and stored on a secure computer in Lilongwe.

The FGD guidelines questionnaire tool can be found on Pages 5-7.

Data analysis and interpretation

The FGD will be transcribed into English by a bilingual speaker. We will back-translate a sample of the FGD transcripts through another bi-lingual speaker and compare/check for inter-rater reliability.

The transcripts will then be analysed first by grouping text into themes in relation to the FGD guidelines, and then by analysis of each theme, in line with common methods of qualitative analysis.

Dissemination:

The report should be completed in March 2010 (see timeline on page 4). It will then be shared with the rest of the MaiKhanda programme staff, with special attention paid to those implementing the Women's Groups: the Community Mobilisation Officers and Women Group Facilitators (WGF), perhaps at their next quarterly meeting. Arrangements will also be made to share the findings with the Women's Group members via the WGF.

Timeline:

The FGD will be carried out at one time point, during Phase IV of the WG action cycle (Sept-Oct, 2009)

The timeline, which is also part of the annual plans for each of the district offices, is as follows:

MaiKhanda Detailed Implementation Plan

Monitoring & Evaluation:District Planning-2009

	Actvities	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10
IV	**Strategy: To conduct process evaluation**									
B	***At the community level***									
2	Evaluation of Women's groups: FGDs									
	Develop Protocol/Objectives									
	Develop the tools									
	Eng-Chw translation									
	Review the tools with CI members									
	Chw-Eng back translation									
	Finalise tool									
	Piloting the tools/field testing									
	Orientation of staff conducting the FGDs									
	Conduct FGDs									
	Data entry and cleaning									
	Data analysis and interpretation									
	Report writing									
	Dissemination									

CONSENT FORM-WG FGD

District _____ FGD Facilitator _____

WG(s) _____ Designation M&E Officer

Organization MaiKhanda

Hello, I am ……. working as a MEO with MaiKhanda based in…….district office.

As you are aware MaiKhanda has been running Women's Groups in communities such as yours since 2007. One of our project objectives is to understand how we can improve Women's Groups. We are conducting this Focus Group to gain knowledge of your experiences as a woman's group member so that we can have such an understanding of how we can improve the programme. By agreeing to take part in this focus group you will help us learn from the current women's group intervention so that the implementation of women's groups in other communities in Malawi can be improved in future.

We would appreciate if you provide us with accurate and honest information, as this will facilitate us to have a better understanding of the women's groups.

- There are no wrong answers, anything you say is important.
- We will maintain complete confidentiality regarding your identity.
- You do not have to answer any question that you don't want to answer
- All information provided by you will be used for evaluation purposes only.
- You may withdraw at any time

If you agree to participate in the focus group, could you please provide us with your written consent:

Name _____ Signature _____

Place _____ Date _____

- Consent for tape recording focus group:
  We would like to remember all the important things that you say, so we would like to record the focus group. The recording will be kept confidential and will not be shared with anyone apart from MaiKhanda M+E staff. Is it OK for me to record the focus group?

  Yes ☐
  No ☐

Date of Focus Group (DD-Mon-YY)

QUALITATIVE ASSESSMENT TOOL: FGD GUIDELINES

Probes and hints for Moderator

Rapport Building and introductions: Welcome to this discussion of Women's Groups, please feel free to express yourselves. Do you all know each other? Please could we go round the group and introduce ourselves. Takulandirani pazokambirana pano pa gulu la amayi, chonde mukhale omasuka mukukambiranaku. Kodi tikudziwana tonse pano ngati? Ndipemphe kuti aliyense angotikuwuza kuti ndi ndani kuyambira mbali iyi.

1. Motivation for attendance of Women's Group

Cholimbikitsa/ chikoka ku kabweredwe ku gulu la amayi.

- Why did you first decide to attend the meetings? Was it easy for you to reach this decision?
- Kodi chidakupangitsani kuti musankhe kupita ku misonkhano imeneyi ndi chain? Kodi chinali chinthu chophweka kupanga chisankhochi?
- Did you continue to attend the meetings? If so why? If not, why not?
- Kodi munapitiliza kumapita ku misonkhanoyi? Ngati mumapitabe ku misonkhano imeneyi, mumapitabe chifukwa chani? Ngati munasiya, munasiya kupita kumisonkhano iimeneyi chifukwa chain?
- Do you attend all of the meetings of the group? Or only certain meetings? – why?
- Kodi mumapita ku msonkhano uliwonse wa gulu limeneli? Kapena mumapita ku ina mwa misonkhanoyi? Ngati ndi choncho nchifukwa chani?
- What would you have done with your time if you didn't attend the Women's Group meetings?
- Kuchikhala kuti simunapite ku misonkhano imeneyi ya amayi, kodi nthawi imeneyi bwenzi mukuchita chiani?

2. Effects of women's Group intervention

Zotsatila kuchokera ku magulu a amayi

- Do you feel that your Women's Group is making a difference to your life? If so, in what way? If not, why not?
- Kodi mukuwona ngati gulu lanu la a amayi likuthandiza kusintha zinthu zina mmoyo mwanu? Ngatidi ndi choncho, pachitika kusintha kotani? Ngati palibe kusintha kulikonse, nchifukwa chiani kusinthaku palibe?
- Do you feel that your Women's Group is making a difference to the lives of other women in your community? If so, in what way? If not, why not?
- Kodi mukuwona ngati gulu lanu la amayi, lasintha motani miyoyo ya amayi ena a mmudzi mwanu muno? Ngati kusinthaku kulipo, miyoyo yasintha motani? Ngati sinasinthe, nchifukwa chiani palibe kusinthaku?
- Do you feel that your Women's Group is making a difference to other people in your community? If so, who? and in what way? If not, why not?
- kodi mukuwona ngati gulu lanu la amayi, lasintha motani miyoyo ya anthu ena a mmudzi mwanu muno? Ngati ndi choncho, ndi anthu ati amene asinthika? Ndipo asinthika motani? nchifukwa chiani palibe kusinthaku?

Probe for knowledge gained. How has it helped individual members? How important is it for the group?
funsitsani za mzeru zimene apindula. Kodi zathandiza membala aliyense payekhapayekha? Zili ndi phindu lotani ku gulu lonse?

Probe for changes in attitude amongst group members and the wider community in terms of women's health, birthing practices (including place of delivery –be neutral don't mention Health Facility) and care of newborns
Funsitsani za mmene maganizo kapena chikhulupiliro zikusinthira pakati pa ma membala ndi mudzi wonse makamaka poyang'ana umoyo wa amayi, ntchito zokhuza kubereka kwa amayi (kuphatikizapo malo amene amayi akumachilira – koma musatchule chipatala chilichonse) ndi chisamaliro cha makanda.

Probe for changes in practice amongst group members and the wider community in terms of women's health, birthing practices (including place of delivery –be neutral don't mention Health Facility) and care of newborns

funsitsani za kusintha komwe kulipo pakati pa mamembala a gulu la amayi pamodzi ndi mudzi wonse makamaka poyang'ana ntchito zokhuza umoyo wa amayi, mmene akumachilira/ kuberekera ndi chisamaliro cha makanda

- What d**o** you think the biggest challenge(s) are for your women's group?
- Kodi gulu la amayi likukumana ndi mavuto otani?
- Could you describe what your biggest achievement has been as a group (if anything)?
- Tatilongosolerani ndi phindu lalikulu lotani limene mwapeza ngati gulu pamodzi?

3: Women's Groups and Quality of Life

I would now like us to talk particularly about how Women's Groups might affect quality of life.

Pa nthawi ino tikambirane za mmene magulu a amayi angakhuzile kapena kusintha umoyo wabwino wa amayi.

- Does the term quality of life mean anything to you? What is your understanding of 'quality of life'? What comes to mind when you think of a good quality of life? Or a bad quality of life?
- Kodi liwu loti umoyo wabwino limatanthawuza chilichonse kwa inu? Mumamvetsa bwanji akati umoyo wabwino? Mumakhala ndi maganizo otani pa nthawi imene mukuganiza za umoyo wabwino wapamwamba? Kapena umoyo waskhala bwino/ wovutika?
- Think about the effects of Women's Groups that we were just discussing. Do you think any of these impacts on quality of life? If so, how?
- Tangoganizani za mmene timakhuzidwira ndi magulu a amayi zomwe timakambirana posachedwapa. Mukuwona ngati pali kukhuzana kulikonse pakati pa mmene timakhuzidwira ndi umoyo wabwino? Ngati ndi choncho, zikukhuzana motani?
- We would like to try and measure quality of life and would like your help in understanding exactly what we should ask. I have here a questionnaire for measuring the quality of a person's life using 26 questions. May I share them with you and ask if you think they are good questions to measure quality of life? I would also like to ask you if your woman's group membership affects each question.
- Tikufuna tiyese kuyeza umoyo wabwino ndipo tikufuna chithandizo chanu kuti tithe kumvetsa bwino bwino chimene tikuyenera kufunsa. Panopa ndili ndi mndandanda wa mafunso 26 amene amagwiritsa ntchito kuyeza kapena kupeza muyeso wa umoyo wabwino. Ndigawana nanu ndi kukufunsani ngati mukuganiza kuti ndi mafunso oyenerela kuyesa umoyo wabwino. Ndikufunanso ndidziwe kuti kukhala membala wa gulu lanu la amayi kumakhudza funso lirilonse.

Spend more time on the questions that have not already been covered in the conversation so far

- Go through the list of WHOQoL questions. For each one in turn ask:
- Werengani mafunso onse a WHOQoL. Pa funso lirilonse funsani:
    - Do you think this will help us to measure a person's quality of life here in Malawi?
    - Mukuganiza kuti zimenezi zithandiza kuyeza umoyo wabwino wa munthu muno mMalawi?
    - Do you think the answer to that question may be affected by Women's Groups? If so how? If not, why not?
    - Kodi mukuwona ngati yankho la funsoli litha kukhudzidwa ndi mmene magulu a amayi aliri? Ngati ndi choncho, yankholi likukhudzidwa bwanji? Ngati silikukhudzidwa, mchifukwa chiani?

Is there anything else that you would like to share about your experience as a women's group member?

Muli ndi chokamba china chilichonse

Do you have any questions?

Muli ndi funso lirilonse?

End of focus group discussion: Thank participants for their time and effort in taking part in this focus group discussion.

Zikomo kwambiri chifukwa cha nthawi yanu ndi kutengapo gawo mu zokambiranazi

Appendix M

Thematic Analysis of Focus Group Discussions

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
Delivery place	***was in village/TBA, now HF***	"in the past days it was possible that other children could be delivered right here at the village but.. now most children are being delivered at the hospital because of this organisation (Maikhanda)" [FGD1.p1]
	(because of MaiKhanda)	"in the past I used to see most people delivering right here in the village but.., since the coming of… we have joined this group which is good that we are delivering at central." [FGD1.p2]
		"The time I started delivering, we used to deliver through TBAs. Since the arrival of this group, Maikhanda, we have learnt to go to central." [FGD1.p3]
		"I have given birth..2 children.. passed away.. right now I also have 2 children.., however this time I delivered at hospital all these children" [FGD1.p4]
		"I have given birth to eight children since. Among the eight, some children were delivered at TBAs. So since the arrival of this group I joined, I could differentiate delivering at hospital and TBA. Hence the four children were delivered at the hospital." [FGD1.p5] {can't have delivered all 4 hospital births in the 2-2.5 years since joining MaiKhanda so all hospital deliveries unlikely to be due to MaiKhanda}
		"I have given birth to four children. All these children I was delivering at TBA before arrival of this organisation" [FGD1.p6]
		"I gave birth to eleven children, 5 children I delivered them at TBA, the other 4 were delivered at the village that is at my house. The eleventh child was delivered at the hospital through operation. That's when I stopped delivering because the uterus burst." [FGD1.p7]
		"I have delivered seven times, 6 through TBAs but the seventh after starting the women groups in the same year, 2007, was delivered from central." [FGD1.p10]
		"I have delivered 4 times. Two pregnancies, I delivered at TBAs but the other pregnancies I delivered at the hospital. Hence I saw the difference between TBAs and the hospital." [FGD1.p10]
		"I started in 2007 and I have 4 children. So among the 4 children, 2 were delivered at central and the other 2 at home." [FGD1.p12] {4 children in >3 years!!}
		"I have 4 children. Among the 4 children; 3 were delivered here at the village at the TBAs and 1 at the hospital. So I differentiated" [FGD1.p14]
		"I benefit because what I used to experience previously and now are different. Because expectant women were delivering along the way, others were failing to walk; all those problems are now terminated. " [FGD1.p13] {she also says that they don't have a bicycle ambulance, which contradicts this}
		"the change has been observed as women used to deliver at TBAs previously and now they are delivering at the hospital." [FGD1.p15]
		"In the past most people believed to deliver at TBAs, but today people have changed, they now believe to go to the hospital" [FGD1.p1]
		"the advantage is you hear and the way... the way things are for a person that is required to deliver at the hospital not at TBAs" [FGD2.p6]
		"Now we see that things have changed now, women when we are about to deliver we carry them to the hospital and they are received properly." [FGD5.p6]
		"there were a lot of people who used to rush to TBAs and there we saw that it slowed down… ...There was no particular reason but the people who were rushing to the TBAs were just ignorant." [FGD5.p1]
		"So when MaiKhanda came to teach us things like those, that's why people realized that we could rush to the hospital unlike to TBAs where there is nothing to help us except death." [FGD5.p9]
		"and most people who were pregnant; they could deliver on the way. It's not reverent, children seeing that; it is eliminating adult respect. So when this organization of Maikhanda came, it removed all those that everyone is delivering at the hospital" [FGD5.p3]
		"There is that change because in the past before women started going to the hospital together with men, like I said in the past people used to rush to TBAs. And at TBAs while delivery people could lose women lives or even delivering still births. However, things have changed a lot now as you are together with the men rushing to the hospital." [FGD5.p6]
		"We used to experience a problem of women delivering here at the village. so that problem is now over we deliver at the hospital" [FGD6.p2]
		"The change is because of the group, many were indeed procrastinating that they used to deliver here at the village." [FGD6.p9]
		"[Moderator] Why did most people deliver here at the village? [Respondent] "Because of transportation, you could get sick maybe at night and the hospital was far away. So when the group came, they gave us the bicycle ambulance and now thing are different because we are able to get to the hospital early and whenever a woman realises that it is her month she takes off to wait at the hospital." [FGD6.p6]
	fines/coercion for not delivering at hospital	"So nowadays we say anyone who is procrastinating going to the hospital should be paying K1000.00 or a goat. So we are making sure that everyone is frightened, before the time they rush to the hospital to follow what we established." [FGD5.p9]
		"since we started the Maikhanda group, there has been no record of anyone delivering at home or along the way, everyone delivers at the hospital. They all go to wait delivery at the hospital towards the end of eight month. Labour starts while they are there at hospital and they just get into the hospital. Or when they waited a bit as a person usually waits in the beginning, the labour starts here at home but she is rushed to the hospital and delivers faster. All this is because men took a role… 'is there any reason to pay a goat' now things are fine." [FGD5.p10]
		"whenever a woman is pregnant she is going to the hospital, and anyone who was delivering at the village was fined and taken to the group village headman, and they saw it was better for them to join the group to reduce the problems." [FGD6.p1]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(also fine for the TBA) (Money from fines goes to TA!)	"Some women in the village now realize the significance of going to the hospital since delivering at home attracts a fine of K500.00… …TA Kalolo is the one who made that decree or else the Village Headman who fails to implement that pays a fine of a goat… ….Once a woman delivers at the TBA she pays a fine of K500 and so does the TBA… ….The money goes to TA Kalolo" [FGD7.p10]
	Bad experience at TBA/village	"my delivery at TBA, I experienced problems during my first and second delivery. I indeed experienced problems, an ambulance came to take me but luckily I delivered." [FGD1.p6] "in the past there were problems; people who were delivering at the village were dying" [FGD1.p9] "here at the village because there is little care when a woman has delivered" [FGD1.p15] "sometime back a woman went to the TBA and there she lost the child.. later she also died." [FGD1.p1] "Maybe the person could run out of blood, or maybe the foetus could start coming out with a leg during delivery. so there were a lot of things and here at the village it was not possible to help her or give her the blood" [FGD6.p5]
	Good experience at hospital	"Since that time {2007} I have been delivering at the hospital and I have observed that it is different and there is respect. The delivery process is also good and it's helpful and we are now teaching people as we are in this group so that everyone should be delivering at the hospital. And they should be able to see the difference that I witnessed." [FGD1.p6] {contradicts herself - did say earlier she delivered all 4 children at TBA}
	(better than TBA/Home)	"If we experience a complication, every complication the TBA could not control it unlike the hospital. If we go to the hospital and we have complications, the doctors are able to assist." [FGD1.p11] "I have delivered seven times, 6 through TBAs but the seventh after starting the women groups in the same year, 2007, was delivered from central. Hence I could differentiate with my past delivery. There I delivered in a right place. Those are my words." [FGD1.p10] "I have delivered 4 times. Two pregnancies, I delivered at TBAs but the other pregnancies I delivered at the hospital. Hence I saw the difference between TBAs and the hospital." [FGD1.p10] "I started in 1997 and I have 4 children. So among the 4 children, 2 were delivered at central and the other 2 at home. I saw the difference with delivering at central. I started working my duties on.. mmh..2007. hence I could see the difference that's why I joined." [FGD1.p12] "I have children; I had 6 children, 1 passed away because I delivered at home. So after realising that this was the first child, the second child I delivered at hospital. I saw that the hospital was a very good place until now all other 5 children I delivered at the hospital." [FGD1.p13] "the advantage I was explaining is at the hospital as compared to the TBAs" [FGD1.p15] "the negativity of TBAs.. and the advantage of the hospital because of being in the good maternal group" [FGD2.p4] "the thing is, a person is required rush to the hospital, move from the TBA to the hospital.' [FGD2.p8] {this was in response to a question asking about what the person would change about the WG!] "things that we would like to change are; firstly, going to the hospital especially when a woman is expectant. Just when she is tired she should rush to the hospital for assistance that they give us should work out properly." [FGD2.p5] {also in response to a question asking what they would change about the WG!} "preventing maternal and neonatal deaths is by rushing to the hospital and not waiting at the village or at the TBA." [FGD2.p13] "it is good to go to the hospital where care is good rather than the TBA where a lot of this group's members use to go more often and we could hear stories that a woman had gone to the TBA and whilst there the child we learnt the child came out first and they have sent the woman to kasungu district hospital for further attention and the last thing we hear is that the child died. " [FGD3.p1]
	(post-natal care)	"I used to deliver at home but now I go to the hospital because care is inadequate at the home. When time to deliver was due I could just use the floor without a plastic sheet but at the hospital, a bed is provided and so is a plastic sheet. The baby is delivered at a good place, on a bed." [FGD3]
	(post-natal care)	"I am one of those who used to go to Traditional Birth Attendant (TBA) whenever time to deliver was due but when I visited the TBA care was very little where you could be sent home as soon as you gave birth while at the hospital where I have started going since I joined this group one is given an opportunity to wait perhaps for two days until she regains strength and the baby is well taken care of. At the TBA you are not cared for." [FGD3.p4]
		"again during delivery you are supposed to go to the hospital so that the hospital staff should help you unlike the TBA." [FGD2.p4]
	(good in general)	"my maternal experience was not difficult because whenever I got sick I could rush to the hospital" [FGD2.p2]
	(better than the past)	"the hospital staff; they way things were in the past and now are different as to how nurses receive expectant women. They are receiving them with respect than before. Previously people used to complain about the hospital and they couldn't go but now people are going freely because they are received with respect, they are being taken care of as they are expectant of two lives, her life as well as the child expected. People when they are going to the hospital it is very nice, things have changed I this area. People going to the hospital, thank you very much." [FGD1.p1]
	(C-section)	"my maternal experience I have 3 children, but through operation" [FGD2.p12]
	(blood transfusion)	"When you reach the hospital they right away diagnose if a woman has inadequate blood and they start transfusing. Also if a woman is failing to deliver they assist at the hospital. So we see that it has benefited us a lot and our lives are settling now as deaths are decreasing." [FGD5.p6]

THEMES (alternative wording)	SUB-THEMES (Specifics) (iron tablets, malaria medicine and mosquito net)	QUOTES [id] {my comments}
		"Life is changed because when the person goes to the hospital she receives blood enriching tablets. She also receives malaria medicine and mosquito net to protect against malaria." [FGD6.p6]
Maternal Experience	***Maternal experience good in general***	"I have six children. But I have never experienced any problems during this maternal experience." [FGD2.p4] "I have six children, but I did not experience any problem during my maternal experience." [FGD2.p5] "in my maternal experience I have given birth to 4 children without any problem." [FGD2.p6] "aah I have given birth to only 2 children, but my maternal experience has been very good." [FGD2.p9] "my maternal experience I have delivered 10 times, but I was delivering properly without any problem" [FGD2.p10]
	Better than the past	"our previous maternal experience, it was a bad maternal experience, and this time our maternal experience is very good." [FGD2.p14] "the previous and today's maternal practice are different. The difference is now the deaths are slowing down unlike in the past they were occurring often." [FGD2.p13]
Too many children		"I gave birth to eleven children, 5 children I delivered them at TBA, the other 4 were delivered at the village that is at my house. The eleventh child was delivered at the hospital through operation. That's when I stopped delivering because the uterus burst." [FGD1.p7] "I have delivered 12 children, as back in the days there was delivery without.. An element of assistance. " [FGD2.p3]
Family Planning		"I have delivered 12 children, as back in the days there was delivery without.. An element of assistance. But now we are having freedom, because a persons delivery does not reach 12 times now. They are stopping at 4! 5, 6. That's the stopping point." [FGD2.p3] "what encourages us now is that way things were in the past and now they are very different in terms of the number of child births. Since in the past people could deliver many times unlike at present when we are delivering few children and stop the maternal experience (delivering)." [FGD2.p9] "there seems to be a change because when we are compelling them, teaching them; the women whom we visit concerning family planning, that's what they are using a lot so that the child should grow well." [FGD2.p10] "we learn from [Women's Group Facilitator] who taught us a great deal on what we needed to know on the dangers of bearing children frequently that the cervix wears out and may get torn, one may become anaemic but that we should adopt family planning methods" [FGD3.p6] "We tell them [men/our husbands] that we learn great things such as how we practice family planning so that we are not burdened by the children we bear. We have discussed how we can reduce the frequency of bearing children for life has changed these days because when men are not there we watch the torture women undergo through during delivery at the hospital. Sometimes a child's leg comes out first, delivery become a problem. Giving birth at home us and how we subject children to malnutrition won't help but we should be rushing to the hospital. We cannot afford to be bearing children every year and we find the lessons we get from the groups helpful and we get family planning information from the hospital." [FGD3.p5]
Education	***no education because poor***	"Because that time my parents could not manage money to pay for my school fees." [FGD1.p1 56yrs old] "I stopped at standard 2 because of financial problems since my parents were very poor. So I stopped along the way." [FGD1.p9] "I received less education because my parents were poor" [FGD1.p2 41yrs old]
Child death		"I have given birth..2 children.. passed away.. right now I also have 2 children" [FGD1.p4] "I have given birth 6 times. 2 are dead and 4 are alive. " [FGD1.p8] "I had 6 children, 1 passed away because I delivered at home. So after realising that this was the first child, the second child I delivered at hospital." [FGD1.p13]
WG Facilitation		"I joined this group in 2007. Since that time there was an agent who screwed up a little bit. Right now we can see that our agent is at least doing fine" [FGD1.p4] "although sometimes we meet but they don't work alright, however we could pick other points that were in there.. and we are still able to use them." [FGD1.p6] "people who help us are the ones who were already given to us by the chiefs, but those that did not join in their villages do not help us" [FGD1.p6] "we would like to make sure that our agent is in this and continue teaching us and visiting us, so that our lives together with our children's and family succeeds. As we can see that things are changing. We know that if thing continue like this in the coming years together with our agents, our lives will be good and successful. " [FGD1.p6]
	Being told what to do ***Necessary for WG formation***	"what we are asked to do like going to the hospital when you are expectant and the required care to an expectant person." FGD1.p8 "It was not easy really because there were so many maternal and infant deaths and it was not easy to overcome them till when these groups started with [Women's Group Facilitator] who said the objectives of the groups was to reduce deaths of mothers and infants. It was not easy for us to start that without a leader" [FGD3.p3]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"For this group to start it was [Women's Group Facilitator] who came to talk to us and she initiated the group meetings. We were all called to form this group" [FGD3.p4]
		"People from this community could not know how to go about it. We knew about the problems we were facing but had nobody to lead us" [FGD3.p1]
Good Things ('what makes you happy?') about WG **('What encouraged/motivated you to join the group')** **('What have you benefitted from the group?')** **('Is there anything you can tell us as evidence that 'aah my life has changed now because I have been meeting my friends at the group?')** **('Why did you decide to join the group?')** **('What change has the group brought upon your lives?')**	***Reducing deaths***	"[Since] the arrival of this organisation that teaches about good maternal health, we have reduced peoples deaths in our village" [FGD1.p9]
		"We saw that when we started, women deaths in our area of Kwanji, we are able to see the difference." [FGD1.p5]
		"In the past there were women deaths and in this area of Kwanji people could laugh at us, but since 2007 there is no death we see. It is what is helping us." [FGD1.p5]
		"what encouraged us is the organisation as it has come to encourage us to have good maternal health, to reduce the deaths, then after reduction of the deaths we are seeing that until now the death rate is still low because adults and children could still die." [FGD1.p9]
		"deaths are now reducing unlike that time deaths were frequently occurring." [FGD2.p15]
		"what was helping us is death.. preventing maternal and neonatal death" [FGD2.p13]
		"We were motivated upon hearing deaths of new born babies and their expectant mothers. What we learnt was that the objective of our meetings was that we should strive to reduce these deaths." [FGD3.p1]
		"What motivated me is the same reason that [Women's Group Facilitator] said about reducing maternal and neonatal deaths. We did not just want to lose our lives but resorted that we should respond " [FGD3.p10]
		"Such deaths were many but now they have reduced because people understand. They used to delay going to the hospital but now things have changed and they are no longer going to the TBA and that is what this community has benefited." [FGD3.1]
		"The deaths were occurring frequently like to the neonatal. So when we joined this group we saw that neonatal and maternal deaths are reducing now. " [FGD5.p10]
		"I was very happy with this group when it was coming because this group is leading us to end neonatal and adult deaths. Hence I was very happy to join." [FGD5.p4]
		"deaths have reduced " [FGD5.p9]
		"This have encouraged us because women and neonatal deaths have reduced now unlike the past." [FGD5.p6]
		"We are saying our lives are changed because women are delivering at the hospital, children are born alive and women are staying alive since the arrival of this organization" [FGD6.p6]
		"We are grateful that there are reduced infant and maternal deaths." [FGD7.p4]
	(older people)	"Older people are also not dying because they listen to the advice from Maikhanda." [FGD5.p7]
	(no deaths at hospital)	"We can just say they are not dying because in our village we have never received any death maternal death from the hospital" [FGD5.p7]
	(reduced deaths at hospital)	"People have realized the importance of going to the hospital to deliver ad there have been reduced number of deaths" [FGD7.p6]
	Knowledge	"when you are on the group you take knowledge from your friends that you did not know" [FDG1.p5]
		"to be in the group we share knowledge. What you lacked knowledge, the group gives you knowledge, and you know what to say and know that in Malawi our development, especially on women deaths it has been reduced considerably" [FGD1.p5]
		"we saw different things being shown to us, when a woman is expectant, while delivery showing us different things in there and we accepted them. And there is nothing that we can say that the lessons are inadequate, no but they are enough." [FGD1.p10]
		"yes 8 meetings are enough, because we found outcomes on the part of children especially to their death and women's, on the part of neonates [knowledge of causes of maternal and neonatal death]" [FGD1.p11]
		"we should be discussing within the same meetings while we are learning because it teaches us different ways.. in fight against maternal problems, good maternal practices for women, expectant as well as neonatal." [FGD1.p6]
		"We can use that information, and care for oneself like when you are pregnant it is required to take very good care of yourself. So I could see that those points were motivating us, also our children lives are lengthened to date." [FGD1.p8]
		"you know what to do. You share knowledge with your friends as I said before. And I know what is right and wrong." [FGD1.p9]
		"people have expected to finish their maternal experience without going to the hospital. They could only believe in TBAs since TBAs have knowledge of other drugs. They say you bridged and they have drugs that can release one from the bridge. Now we can see that things have changed and now they believe that going to the hospital is important. So we see that people in this area have changed as compared to the past." [FGD1.p1]
		"I was encouraged to join the group because in a group there are different discussions that you could learn from and you may be able to discover what you did not know at the group." [FGD1.p7]
		"women groups are helping to change in this area, because they teach about maikhanda, that is how women could take part by delivering at the hospital. so the change has been observed as women used to deliver at TBAs previously and now they are delivering at the hospital." [FGD1.p15]
		"they have helped me a lot because there is nothing I knew previously but now I am a very knowledgeable person because maikhanda has been teaching us. " [FGD1.p13]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"when we are on the group we learn a lot of things that we did not know" [FGD2.p4]
		"we benefit a lot of things because we can hear things that we have never heard before.. But now we can hear." [FGD2.p15]
		"It is important that we should be interacting with others in group because you learn a lot unlike being at home. What good can you learn by being at home?" [FGD3.p1]
		"In our group from Petros village people have become knowledgeable." [FG3.p6]
		"I have gotten some knowledge" [FGD3]
		"When a woman attends meetings she has good life from the knowledge the women share whilst in groups." [FGD3.p6]
		"I am happy with this group because it has managed to enlighten us properly." [FGD3.p6]
		"Others stopped because they thought it's a difficult thing. So to us we saw that it is a very good thing because it is teaching us a lot of things" [FGD5.p9]
		"we would also have a backward life [if we didn't got to WG]" [FGD6.p2]
		"We often discuss important issues in this group" [FGD7.p9]
		"At first I thought becoming a member of this group is meaningless but I have leant a lot from this group" [FGD7.p7]
	(well versed)	"the organization has assisted people to be well-versed." [FGD5.p3]
	(no-one reckless anymore)	"And I can strongly admit that there is nobody who is reckless in the village." [FGD5.p1]
	(Timely arrival at hospital for delivery)	"One time when I was pregnant I delivered on my way to the hospital and the baby has cuts due to the place where she was delivered. When I got to the hospital I was scorned at. Since that incidence I have changed, I understand and I no longer delay going to the hospital late" [FGD3.p10] {more an effect of the hospital staff being rude rather than of the WG!}
	(Timely arrival at hospital for delivery)	"We are telling people to go to the hospital before labour starts" [FGD7.p2]
	(Timely ANC)	"in the past people were used to delay to go to the hospital whenever they became pregnant like in my case I used to go to the hospital during my seventh month. This other time when I had gone there I was told I should have gone there when the pregnancy was eight months old for them to seek out my problem because the child inside me was not well position. If only I had gone to the hospital when my pregnancy was one or two months old I would have avoided the complication. I came to appreciate that it is good to start going for the clinic when your pregnancy is not yet at an advanced stage" [FGD3.p1]
	(Timely ANC)	"On the contrary, at the hospital if you follow everything properly; a person when she is pregnant even before the second month, she starts going to the hospital the during first month. Therefore we have seen that it's been very helpful that Maikhanda came." [FGD5.p9]
	(Family planning, child spacing)	"When a woman raises a child till she is grown and later decides to become pregnant the mother has adequate time to regain her health and blood level restored. The cervix has ample time to readjust otherwise the cervix may burst when it is forcibly operating" [FGD3.p8]
	(Family planning, child spacing)	"The benefit I have gotten is how to raise children; people would like to have bear another child as soon as a child is able to sit, or as soon as the starts standing you find a woman already pregnant with no regard to child spacing. A child should be allowed to grow to a until a certain age before becoming pregnant again" [FGD3.p8]
	(Family planning, child spacing)	"Whenever the couple wants to have sex there nothing that is going to stop them because they are practicing family planning. The child does not get malnourished when the parents are practicing family planning. If my household is healthy and so are other households, the entire Malawi nation will be healthy " [FGD3.p6]
	(Family planning, child spacing)	"Our lives changed because we now have learnt about family planning and most women are practicing family planning." [FGD6.p7]
	(child spacing)	"Child spacing is good because it gives you an opportunity to freely perform household chores when the child can be left to go and play somewhere. The child grows strong and has a chance of going to play with others away from the home because of age rather than becoming pregnant when the other child is only learning how to sit on her own. We have learnt the importance of family planning in that a mother has an opportunity to raise the child and do household chores. The body too maintains its health." [FGD3.p1]
	(child spacing)	"Since in the past people were giving births frequently and there were more miscarriages." [FGD5.p6]
	(pregnancy nutrition)	"When you eat okra with ashes it is acidic and it destroys any vitamin vital in one's body but since we were taught about it we appreciate the importance of eating balanced diet foods; some vegetables, an egg, some rice or relish should vary from time to time as a woman is expectant." [FGD3.p6]
	(pregnancy nutrition)	"And we are thanking this organization of Maikhanda a lot because it has revealed to us other wisdom that slept. We are growing vegetables since a pregnant woman needs various foods necessary to protect her from diseases." [FGD5.p2]
	(Nutrition, child sickness)	"We have really benefited from this group in terms of how we are able to take good care of our bodies and how we have reduced the rate at which our children get sick attributable to the lessons we have had" [FGD3.p10]
	(child nutrition)	"In the past in our family we could leave a child in the morning and find her in the afternoon but we have learnt that a child is supposed to eat frequently that is when the child grows strong. We have learnt how to take care of children and since started growing fresh vegetables our households have benefited quite a lot" [FGD3.p1]
	(HIV testing)	"because we have learnt practices like both a woman together with her husband testing blood to know how your friend is. " [FGD5.p8]
	(ANC, HIV)	"whether it is my own child in my household has become pregnant, she has to start going to the hospital for check up. Be it in the second month she has to go to the hospital so that they determine her status. It could be that her blood is contaminated. The hospital would tell you how to live a positive life until the child gets better. This is the benefit I have gotten from this group" [FGD3.p2]
	(ANC, HIV)	"It has thought us good things because everyone when she is pregnant she's rushing to the hospital. The first pregnancy you are having tested your blood unlike in the past there was nothing like this. Most people it used to take 8 to 9 months for them to start antenatal classes. Nowadays people have learnt that we should start antenatal classes the first month." [FGD5.p5]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(ANC, HIV)	"how is the importance of testing blood. So when this organization came, it established that people should start antenatal classes when they are three months pregnant. So when they go to antenatal classes, they are tested their blood and seen if they require anything. They say it is required for the child to be protected." [FGD5.p3]
	(ANC, HIV)	"a person could know that there is a way to deliver if you have a virus (HIV)." [FGD5.p3]
	(ANC)	"What I have learnt is that in the past it was taking time for me to start going for antenatal clinics but now things have changed" [FGD3.p12]
	(ANC)	"Yes, our life has changed because right now we are breastfeeding very much and also when a person is pregnant, we are visiting and giving advice. We are telling her to go to the scale when she is four months pregnant. So now we see that things have changed. Some problems that we had have reduced compared to before." [FGD6.p1]
	(ANC, hospital delivery)	"We celebrate that some have realized the importance of going to prenatal clinic sessions and the importance of delivering at the hospital" [FGD7.p3]
	(prevention, balanced diets, blood transfusion)	"the coming of good maternal health has taught us a lot of things. Teaching us like, preventing.. teaching us about blood transfusion, eating balanced diets that would enrich our blood in the body, or anyone who has lost blood to rush to the hospital to get assistance and preventing maternal and neonatal deaths.' [FGD2.p13]
	(nutrition/anaemia)	"Giving them tomato, it helps to restore blood in the body" [FGD3] {does tomato really combat anaemia?!}
	(balanced diet)	"We have learnt a lot such as vegetable production where we share the produce and sell part of it to buy eggs so that we eat balanced diet foods" [FGD7.p1]
	(lack of blood)	"there were various problems like loss of blood, lack of blood that… and women were dying because of difficulties while delivery." [FGD5.p6]
	(lack of blood)	"other women they lose blood or what.. by the time you are delivering. So we have seen that it's a very good teaching that has come with this organization." [FGD5.p9]
	(lack of blood, Ruptured Uterus)	"All along I did not know that when one delivers at home is prone to lose blood and that the uterus can burst but I have come to realize this since the coming of this organization in 2007" [FGD7.p1]
	(birth preparedness, money, transport, supplies)	"Furthermore when a woman is expectant she should always be prepared because labour may begin anytime and you need to keep some money with you so that others may use as transport to take you to the hospital when the time is due. Should one's labour start earlier, others can use the money kept as a starter to aid on transport. One is supposed to acquire what she will cover the child with once she is born; a bathing basin; will the mother have a shawl then; what will I put on as a woman during delivery; what will I seep on. We never bothered about that in the past, we could use the same cloth I am adorned in during delivery and would tear it and use the pieces to cover the new baby with but now things have changed" [FGD3.p6]
	(Bilharzia in children)	"And the children are born without a problem of bilharzia." [FGD3.p6]
	(hygiene)	"They have also helped us on the importance of hygiene at home." [FGD5.p8]
	(PNC)	"I see that I have learnt a lot from this group of Maikhanda especially with advice that we are given that we should go to the scale when we are pregnant. When we give birth, we should take the child to the scale to receive all the vaccination needed." [FGD6.p3]
	Freely able to perform household chores	"Child spacing is good because it gives you an opportunity to freely perform household chores when the child can be left to go and play somewhere" [FGD3.p1]
	Healthy family	"The child does not get malnourished when the parents are practicing family planning. If my household is healthy and so are other households, the entire Malawi nation will be healthy" [FGD3.p6]
	Maternal Health	"it is like the organization explained that it is required to take care of good maternal health" [FGD2.p7] "what encouraged me to join this group is, the way things were in this village some people could die in this village in an attempt to deliver without going to the hospital, lacking transport to the hospital. But now although I joined late, when I saw my friends receiving lessons on good maternal health, I saw that they understand going to the hospital. Whenever three months have elapsed seeing that a person is three month pregnant, immediately we take her to the hospital to get good maternal health." [FGD2.p3] "it is important since it prevents maternal and neonatal problems" [FGD2.p10] "what made us to join this group was neonatal deaths and pregnant mothers." [FGD5.p10] "I joined this group because I saw that it's a group that is taking care of good conduct like good maternal practice unlike the old practice." [FGD5.p6] "The problems we used to face as women made us join this group... ...Problems we face during delivery... ...The problems we face during pregnancy, those we face as women" [FGD6.p1.p3]
	Family Planning	"there seems to be a change because when we are compelling them, teaching them; the women whom we visit concerning family planning, that's what they are using a lot so that the child should grow well." [FGD2.p10] "we learn from [Women's Group Facilitator] who taught us a great deal on what we needed to know on the dangers of bearing children frequently that the cervix wears out and may get torn, one may become anaemic but that we should adopt family planning methods" [FGD3.p6]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(Have sex without fear of pregnancy)	"Whenever the couple wants to have sex there nothing that is going to stop them because they are practicing family planning." [FGD3.p6]
	(can't go to WG meetings due to too many children)	"Bad life is when you cannot join your colleagues when they gather for group meetings and whenever they invite you say; how can I attend meetings with a child on my back, I am also pregnant and this little other one is sick and cannot walk on his own, who is going to stay with him a home and look after him or who can help me carry him so that I attend the group meeting. Such a person does not live a happy life, she is always grumbling; how can I join my friends at group meetings, they participate in group meetings and they work together. . Living a separated life is not good." [FGD3.p6]
	Changing whole community **(importance of male involvement)**	"To be frank we have contributed to a change in this community" [FGD3.p5] "If a woman has been impacted the same applies to the man because if the woman is living in misery, the man's misery is even worse. While pondering on to solve his household problems he realizes the women get assistance from the MaiKhanda women groups" [FGD3] "We meet as we are with men as people from village. We occasionally chose to meet together with men that is when we chose to discuss issues that concern women only hence there is no way there should be somebody who has not been impacted with these women groups" [FGD3.p6]
	Antenatal Care	"We visit them and encourage them that once their pregnancies are a month or two month old they should start going for antenatal clinics" [FGD3.p1] "Whether it is the woman who has a problem we visit them and encourage them to go for antenatal clinic to meet a doctor." [FGD3.p1]
	Waiting at the hospital for delivery	"The women have proved that they are very committed every time they are in their ninth month they will have already started going to the hospital waiting for delivery." [FGD3.p1]
	Agreement with others	"That's when I am seeing that the encouraging group is good, it has encouraged us to agree with the chiefs as well as other people." [FGD1.p9]
	Solidarity/ Encouragement of each other	"In the past we used to be face down, all tasks were frail but nowadays we encouraged each other among women. For us not to be weak let us uplift MaiKhanda activities." [FGD6.p9] "We now are able to love one another in our group and we visit each other when one gets sick" [FGD7.p1]
	Improved Lives	"Again it's helpful because our lives together with our children's are improving with strength and they are good." [FGD1.p6]
	Home with all necessities	"We consider a home with all necessities" [FGD7.p9]
	Education for children	"That we should seek medical assistance due to malnutrition, that does not happen in this community instead we are saying let us build school where our children can learn" [FGD3.p6]
	Emergency cash fund/bank account	"Sometimes we benefit from the money that we raise which is borrowed in times of child's sickness where we need money to take the child to the hospital. When you are back from the hospital you determine which work to do so that you can repay the debt." [FGD3] "Our group has benefited a lot because right now we are busy soliciting money so that we open a bank account something that never crossed our minds in the past. That is the main gain that our group has realised" [FGD3.p1] "we have generated some money and are planning to open a bank account" [FGD3.p1] "The benefit we have gotten as a group is that we were advised to open a bank account. With the contributions we will be making to the bank we would be sharing the money among ourselves at the end of every year. Should one have financial problems would go and withdraw some money and repay letter. With MaiKhanda group we also have a Village banking facility running weekly" [FGD3.p7]
	(use of emergency fund)	"This money when it was put into the account so could use it like now when we have visitors. Or we could use it to help our friend when she falls sick." [FGD5.p6]
	(garden for selling crops for emergency fund)	"We use these gardens to grow crops. When we plant the crops, we sell them after harvest. The money we put it to our group account to assist any of us when she falls sick" [FGD5.p1]
	Garden for nutrition	"What we benefited here is, we have a garden and when a woman is pregnant she eats various relish and she is healthy" [FGD6.p7] "My life changed a lot because of the group as we now we grow various vegetables: cabbages, pumpkin leaves that help me in my body unlike in the past we used to consider it useless." [FGD6.p1] "We were getting weak forgetting about the garden, on balanced diet we got weaker but now everybody is spending time at the garden." [FGD6.p9]
	(money for garden got by doing casual jobs)	"How do you get the farm tools you use at the garden? " [Moderator] "We do casual jobs and the money we get we use it to buy fertilizer or insecticides" [FGD6.p7]
	(garden as only benefit)	"Alright, is there anyone who can say 'aah the benefit is not really from the garden but I have actually benefited in this way'." [Moderator] "Let us just say that's the only benefit" [FGD6.p5] {respondents not thinking through the question well as they have already mentioned delivering at hospital and maternal health benefits etc.}

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	Animal rearing	"we are raising pigs for the group" [FGD3.p1]
	Changes in cultural practices	"There is change especially when the baby is born, most people used to take pumpkin flowers on its umbilical point. Or taking pestles dirt and put it on its head, all those thing they have stopped being practiced since they were just practices before MaiKhanda came. Those things stopped as babies are growing without threads in their waists or on their necks." [FGD5.p3]
	(bathing new-borns properly)	"In the past when taking care of new-borns, we could apply it with pounder's dirt, dirt of mouse and others, pumpkin flowers. But when MaiKhanda came, it taught us how to take care of new-born babies. When the child is born we take care of it properly, bathing it without applying anything on the umbilical point until the umbilical cuts off. Bathing it properly, bedding it on good place, good clothing and change the napkins frequently. That's what we have benefited because we stopped all old practices since the arrival of Maikhanda." [FGD5.p10]
	Cleanliness	"We are helping others buy soap" [FGD7.p7]
	Being Patient	"Being patient" [FGD7.p10] "I have also changed because since I joined this group I am patient with those who wrong me" [FGD7.p8]
	Being respectful	"Being respectful" [FGD7.p6] "Being respectful" [FGD7.p3]
	Being Loving	"Loving" [FGD7.p9]
	Higher self-esteem	"My life has changed because of this group otherwise I could not just take it in the past when somebody bothered me" [FGD7.p2]
Male involvement	***Importance of male involvement***	"people just took it an issue concerning only women yet the issue is not only about women since a male is required for the validity of maternal experience." [FGD1.p1]
	(male involvement via chief)	"The meeting to invite men was called by the chief. And they agreed when the committee members met. At that meeting they saw that a good organization has come and therefore we needed assistance. While discussing that they also saw that men and women should work together." [FGD5.p7]
	(male involvement via chief and MaiKhanda agents)	"Indeed this meeting was called by the chief, but he went through the Maikhanda agents when they requested to meet with all men, as the meetings they started with only women. So at meeting number 3 we were called together with men. We explained to men all maternal problems including pictures that we showed them, just as we were taught. When men saw the problems that we showed through pictures they saw that it was true." [FGD5.p4]
	(training for men too)	"At the meeting we received training, when it was also conducted to men it was adding to their motivation to work hard." [FGD5.p4]
	Man joined WG before wife!	"one couple it was the man who joined first who in return persuaded the wife to join and the woman as it is has joined. She kept asking how she could join following the persuasion from her husband and her female friends" [FGD3.p1]
	Men understand/like getting involved	"the issue of maternal health as wise men think deep, it is something that is very important to be a member of this group because most problems have been reduced compared to the past." [FDG1 man] "men of this area are very happy with the issue of maternal health." [FGD2.p7] "men of this area understand issues of maternal health, because they have now started sending their wives to antenatal classes and they escort them at most. " [FGD2.p1] "With the coming of our Women Groups Facilitators we have seen a lot of change because men too are encouraged to actively participate in group activities " [FGD3] "They appreciate that if the problems their wives are facing are to end they have to be involved in the activities that are happening in the women groups" [FGD3] "We were together on Sunday with the men" [FGD3] "It came to a point when we started this organization that men should start participating. It was addressed at our 6th meeting that men should take part. Then we called all men to start taking their role. When we started discussing with men, we saw that they understood and used what we were discussing on our group... ...We can say there is no man who is not taking part, we are working with them." [FGD5.p10]
	(going to ANC with wife)	"And now it is good news to hear that one has conceived, we move around gathering each other to go for antenatal classes, men and women both going for antenatal classes. So we really thank MaiKhanda" [FGD5.p4]
	(going to ANC with wife)	"It is really true that men have benefited, when we ask them to accompany us to antenatal clinic they no longer procrastinate as they know it is good. They escort us whole heartedly" [FGD6.p3]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(because of previous bad experience)	"The other thing that prompted men to take their role was… maybe when a woman delivers on the way to the hospital, and before people could go to inform others at the village, kids could go and inform the husband that your wife has delivered along the way, we have seen this... that. So when we explained to men that there is this organization and if you wish to join… the men accepted to join because they are also affected and they were also ashamed when the kids were telling them… 'hey you baby… this and that…'. So they got strong and we thought so that we would be telling them that since we do it together and the condition pains me we should start of to the hospital. The husband cannot procrastinate because he will realize that what happened to that family can also happen to me, let's go to the hospital. That is why men are participating." [FGD5.p3]
	Telling wife to go to ANC/ Hospital for delivery	"When a woman gets pregnant, we teach them Maikhanda lessons, and every man in this village is supposed to follow. When a woman gets pregnant, during the third month the man is supposed to take his wife to the hospital to start antenatal classes and they do everything together. Until the end of eighth month, the husband is required to tell his wife to go to the hospital to wait for delivery time. The wife goes to the hospital to wait for the time so that she should deliver properly. That's when men decided to seriously take their role since the practice is helpful. Hence they are strong in their role now." [FGD5.p10]
	Men originally sceptical/didn't understand then won round	"these groups at the beginning, people especially men from this area took it like.. this group is useless, because.. for women and men to sit together and discuss issues of maternal health. They perceive it as something they cannot benefit from. Also most issues many times many times the issues are considered a taboo and they are perceived as aa.. 'These issues are not right for people to hear them publicly since they occur behind doors/ in hiding'. As this issue is continuing to date most people have changed now. " [FGD1.p1] "when we received this issue as men, there are other men, myself in particular I used to take it as an ineffective thing, and when women were coming to meet, it was perceived as only time wasting for nothing. But when we realised the its goal, we saw that they are very effective things." [FGD1.p15] "men of this area they have now started to understand because in the past they were very underdeveloped but now they are all working hard to join the group. " [FGD2.p8] "It was really a hassle for men to accept this and we had to go to the chief to seek assistance for him to brief the men and it paid. We started meeting at his house. When we started meeting at the chief's house the chief would attend our meetings too. The issue concerns us more women who bear children. When told our discussion the chief encourages us saying he is impressed with what we are doing and he persuades men to be attending the discussions. Some could give in while others were angry but gradually they started attending the discussions. These days it is no longer a problem." [FGD3.p6] "What really happened was men had to take a role in maternity. Since they used to leave it to women, when one got pregnant. They forgot that maternal health concerns both (husband and wife)" [FGD5.p1] "Yes, men too benefited because when we were telling them about the hospital they used to consider it worthless, as they were using traditional methods. Our parents in the past used to encourage people to deliver even at the village, without even going to the hospital. 'The child that has been delivered at the village is just like any baby born from the hospital', but we could tell men the problems/complications that 'although you are saying so a woman experiences various problems; she could loose blood and here at the village are you going to transfuse her? The child could come with a disease (kalongologo) and how are you going to help the child here at the village?' so they saw that to be helpful and when we invited them, we explained to them and they used the information and later joined the group." [FGD6.p1]
	(not helping women to hospital but now do)	"Also, men were not taking any role especially taking there wives to the hospital. Or one has fallen sick at night and not escorts her. But when the organization came it assisted men to take a role in escorting their wives to the hospital when it is time." [FGD5.p3]
	(providing women with resources they need)	"it has assisted us because what men could say on maternal issues, they were not participating. But today even men are taking a part, since when you go together to the hospital they tell him 'the woman has this problem, or you have such a problem and such will be required'. The requirements when you leave the hospital… like in the past we could go ourselves and when you are telling them that at the hospital they require this, they need a basin, they need or what; those things you were like saying just because you wanted to buy them unlike now they are able to hear them themselves. We feel it has encouraged us and helped us a lot." [FGD5.p1]
	(providing women with resources they need)	"To expression my gratitude, my husband used to harsh that he couldn't consider my pregnancies, but when this organisation came we are now okay at home. He assists the children and when I conceive, to say the truth he get various foods for a better pregnancy." [FGD5.p7]
	Past bad attitude of men/ men's permission needed	"Men are just comfortable bearing children they do not mind really what happens they will say; 'this one is able to walk now let us have another child'. Can you see this child [points at a child] he would have already stopped breastfeeding. Now women are suffering in silence in the households, whenever they want to express themselves they are told to keep quiet or are beaten. It is the man who wants you to bear children, you have no choice but to obey." [FGD3] "It was difficult because it was easy for us ladies to understand but it was hard to convince men because generally women are afraid of men. It becomes a problem for a woman to be seeking permission from the husband every time they would like to attend group meetings. Not many men understand but for some of us it was an easy things." [FGD3.p4] "was difficult at first because as men refused to be patronising these meetings they were even refusing their wives from attending the meetings. They would say; 'what are you going to do there instead of working here, you will just waist your time there. These days having explained to them the importance of the group they seem a little bit understanding." FGD3.p5 "It was very hard for men to give in. Some women lose a lot of blood during delivery" [FGD3.p2]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	Male involvement through coercion/fines	"So the meeting that was occurred with the agents that we together with men should sit down, they said that a man who fail to take care of his wife, to take her to the hospital, while she was pregnant he should pay money (they said MK1500). That is why most men took the role fearing paying the money since one could have no money at that time. So in fear of that they are taking they are taking us to the hospital and all is going well through that establishment." [FGD5.p8] "Now men really got afraid when it was established that any man who fails to attend to his wife while she is pregnant, he should be fined a goat. Men really saw that this organization was really good, is there a particular reason why I should leave my wife and pay a goat? Why cant I just do what is required since its important? So since then, when a woman says she is not okay she is pregnant, the man starts preparing for her to start antenatal classes." [FGD5.p10] "The main committee said whenever she starts attending antenatal classes, she should never deliver at home or along the way, the husband should also be fined a goat. Hence as pregnancy is unpredictable, while she is close to deliver, he sends his wife to wait delivery time near the hospital" [FGD5.p10]
Things to change about WG / problems	***More training supplied***	"Maybe if we are trained other things but what we learn at this group since we started to learn everything makes us very happy." [FGD1.p6] "Our plea is that you will continue visiting us. We will be receptive to your lessons" [FGD7.p1]
	Need Bicycle ambulance/ Transport	"the only worry is a bicycle ambulance that would help us go to the hospital since there are others who fail to walk to the hospital due to the long distance." [FGD1.p13] "As a group when we interact with expectant women is that they have transport problems when they want to go to the hospital. The time is due we are always worried about where we are going to get a bicycle" [FGD3.1] "As for Maikhanda group we realize that the hospital is very far. We find it hard to assist a woman whose labour starts at night and for us to identify someone with a bicycle who is nearby" [FGD3.p5] "And we have a request to make about transport we need when going to the hospital" [FGD3] "The problems we are facing on our group, we could say transportation in times of suddenly fallen illness. That's where we see that they can buy for us since when we call each other (in times of sudden illness) we know we could take a bicycle or what. So we see that transportation in times of sudden illness is a problem here." [FGD5.p6] "The real problem that we are facing in this village is transportation to the hospital. Since an expectant woman could possibly reach the 8th month and get really ill with the condition. So we usually have difficulties to carry our friend to the hospital. Then we just ask the men to make a stretcher to take our friend as fast as possible to the hospital to receive adequate assistance. Actually the real problem that we are meeting is transportation. " [FGD5.p10]
	(at the moment just walk)	"With expectant women, what mode of transport do you use? What mode of transport do you use?" [Moderator] "We just walk on foot, rushing to the hospital.." [FGD5.p1] "Considering walking with a patient, we walk slowly and it takes approximately 2.5 hours" [FGD5.p2]
	(loans for land for dimba for transport)	"I would like to say one more thing on what my colleague has said on transport issue is that if only there was going to be an organization identified that gives out loans so that we can identify a piece of land where we can grow crops where we can cultivate as tionge group. The only challenge would be accessing fertilizer" [FGD3.p6] "The transport we are referring to is the one we need to get a woman to the hospital those whose labour starts unpromptly, those who may not have been waiting at the hospital. Sometimes labour begins when one is in the course of preparing and have to borrow a bicycle and may be late in doing so. It is really a problem in this village, Petros but we also take a part in helping as we encourage others to do likewise." [FGD3.p1]
	Advice on opening a bank account	"My question is on how you can advise us to open a bank account" [FGD3.p6]
	Dimba Garden	"we have only experienced a problem with the garden [cut short as was asking about problems with non-members" [FGD1]
	(money for garden)	"The other problem that we have in women groups is… somebody said the money we buy seed for garden crop (vegetables). The other problem, we face difficulties to maintain our group garden. So we face challenges to get fertilizer or watering tools. So we get luck if someone pays fine or we each contribute K5.00. that is the problem we are facing." [FGD5.p1]
	(money for garden)	"Our group also lacks finances for buying fertilizer which we would use for our farming for us to have well balanced diet otherwise we just use manure at the moment" [FGD7.p9]
	(inputs for garden)	"the problem sometimes the crop does not grow well. Lacking of agricultural inputs and implements like fertilizer and watering cans. So we feel it is a big problem to us." [FGD5.p1]
	More frequent meetings	"time as well as the meeting day so that we should be meeting on.... once a week" [FGD2.p6]
	Members meeting on time/correct day	"We all come very well. It's only that others they are weaker that they fail to come on the day we agree to meet but on the other days they come." [FGD5.p4]
	Absenteeism due to sickness/'other commitments'	"Indeed when we started the Maikhanda group, others were not coming they were frequently absent; however they had commitments and not that it wasn't important. Simply they had excuses; others excuse themselves that a child was sick or others; 'I am sick' and they could report somebody's absence on such commitment. Because when we started, we really started with morale since we could meet in large numbers. Those who were not coming had excuses/ commitments... ...They were not going to other meetings. But they were failing to come because of the reasons we have stated" [FGD5.p10]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"When you started meeting wasn't there absenteeism?" [Moderator] "There were" [FGD7.p8] "What was the reason for absenteeism?" [Moderator] "For some it was due to sickness while some fail to come because they have gone to the hospital" [FGD7.p8]
	Others not meeting because they are 'lazy'	"Some are just lazy" [FGD7.p1] "What do you do with those who are just too just to attend meetings?" [Moderator] "We do visit those who are not coming to the meetings to establish reasons why they are not coming to the group meetings. Some would say my clothes were dirty while some say they had gone to the hospital with their children" [FGD7.p1]
	Others not attending because of ignorance	"Are there other reasons why people fail to attend group meetings?" [Moderator] "For some its just laziness" [FGD7.p8] "In some cases it is ignorance" [FGD7.p6]
	getting WGF to ask others to join meetings	"our agent when visiting us on those days, can also ask others to gather with us on our meeting days. " [FGD2.p6]
	Better organisation of meetings	"Like the messages that came from town they reach us and sometimes they don't reach us early. Hence things doesn't work well, it's possible that sometimes we wait for visitors when the message didn't reach them there. So these are required to change." [FGD2.p12]
	More frequent visits by MaiKhanda staff	"Another contributions a request that perhaps you should often visit us so that we can learn a lot from you and make progress" [FGD3]
	T-shirts	"We were thinking that if you could consider giving us t-shirts so that we are recognized as working with Maikhanda" [FGD3]
	Nothing	"if you are given a chance to change procedures to the meetings, is there anywhere you would wish things to change?" [Moderator] "no nothing" [FGD1.p10] "nothing..?" [Moderator] "yes" [FGD1.p10]
		"There is no problem that we are facing in our group" [FGD6.p8]
	(no problems within WG)	"Here we could say the real problem has not emerged from inside. Since the meeting of Maikhanda started to date, women and neonatal deaths or delivering along the way or at home, all that has stopped. So we are just appreciating that Maikhanda has taught us a certain kind of life" [FGD5.p3]
What else would you spend your time on if not at the WG	***Gardening***	"We would have been tilling at the garden.." [FGD6.r8]
	Making bricks	"We would have been making bricks, we would also have a backward life" [FGD6.p2]
Mechanisms of change	***Through Leaders***	"if we wish to change, this could be accomplished by meeting with our leaders who are leading us here. " [FGD2.p12]
	Unity/ Working together	"things required to change are like unity.. ...somewhere maybe you may not be fine… ...so that we should unite with women… ...it is possible... all, therefore they move properly unanimous " [FGD2]
		"the ways to eliminate the problems could be found only if we discuss unanimously whenever we meet. Therefore our problems at these meetings could be resolved earlier." [FGD2.p4]
		"by encouraging working together " [FGD2.p1]
		"It became easy when people agreed to work collaboratively" [FGD3.p6] "When you say 'people' what do you mean?" [Moderator] "This group" [FGD3.p6]
		"At the beginning when you are starting anything it looks/ appears difficulty and far beyond achievement. So when the people work hard that's when other people says 'ooh this thing is really good'." [FGD5.p1]
		"There is solidarity among us" [FGD5.p3]
	Majority	"There is no way we can negatively be affected because we discuss things as a group and we make decisions based on the majority" [FGD3.p5]
	(chucking out stubborn people from WG)	""What do you consider to be a bad quality of life?" [Moderator] "Stubborn persons… ...When there are such people in a group we evict them so that they do not destroy the group" [FGD7.p8 & p1]
	Meeting early	"Or meeting, we used to gather late but now we have discovered that this thing is important to this life today. We are following the concept of meeting early and we are learning development in this organization of good maternal health. " [FGD2.p1]
	Meeting regularly	"We were reporting differently, maybe one could be engaged but in most cases we were meeting together" [FGD6.p3]
		"We were all coming mostly; if anyone was absent then maybe something has happened with the child or an accident" [FGD6]
	Checking to see why others are not attending meetings	"We went to visit them asking why they were absent. Maybe they were weak with thoughts and others were sick.., so when a child gets sick we are able to go visit to find proof that the person did not come because of different reasons." [FGD6.p1]
	Making people who don't show up to meetings pay fines!	"Those who could not come without notifying a friend that a child or herself was sick, we were telling her to pay money amounting to K50.00. when the money was paid it was put to the same groups account." [FGD5.p10]
		"We say the one who is absent should pay money… …20 Kwacha" [FGD6.p5]
		"We tell such people that they are disintegrating our group and we fine them with K100. We at least understand those who go to the hospital but those who had said their clothes were dirty" [FGD7.p1]
	(people coming to meetings because they are afraid of the chief's penalty)	"We visit those not coming to encourage them and besides they are afraid of the Village chief's penalty, so they do come" [FGD7.p1]
	(telling people they are going to disintegrate the group if they don't come)	"There are some people in the group who are stubborn and once we advise them that they are going to disintegrate the group they understand" [FGD7.p1]
	Share bicycle ambulance with non-members	"Is the bicycle used by everyone in the village or those in the group only?" [Moderator] "Everyone uses it" [FGD6.p4]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
	(but they have to pay, although this is not a problem apparently)	"When someone is sick and gets the bicycle ambulance to get her, we lend her on a cost so that when it's faulty we just use the money for its maintenance." [FGD6.p8] "So those from other villages, how much do they pay?" [Moderator] "They pay MK50" [FGD6.p1] "They pay MK50?" [Moderator] "Yes" [FGD6.p1] "Don't you think this could restrain others who wish to use it to go to the hospital and deliver but they don't have money? "To say the truth those restraints haven't yet occurred because we used to face problems in this area; diseases could occur instantly maybe a person could just die because of transport unavailability since the hospital was far. So with the coming of the bicycle ambulance everybody from the surrounding villages appreciated and they don't feel like an issue when they are paying." [FGD6.p8]
Are 8 meetings enough?	***Yes***	"8 meeting were enough, because we have benefited necessary things as well as the good maternal practice.. And it led us to proper delivery.. Proper and we saw different things being shown to us, when a woman is expectant, while delivery showing us different things in there and we accepted them. And there is nothing that we can say that the lessons are inadequate, no but they are enough." [FGD1.p10] "yes 8 meetings are enough, because we found outcomes on the part of children especially to their death and women's, on the part of neonates [knowledge of causes of maternal and neonatal death]" [FGD1.p11] "So I still see that they are enough at the moment… ...but the number of meetings is required to be maintained at the moment so that if there were other areas that we were wrong we can still learn, but now the meetings are not less or many." [FGD1.p6] "when I see it clearly, it looks like it is good, because when we are meeting we meet very well." [FGD2.p13] "in your opinion do you think 8 meetings are enough to find ways of eliminating the problem" [Moderator] "yes we can find them" [FGD2.p4]
Spread of WG knowledge to non-members	***Through the chief***	"women who do not come to our group to understand issues of maternal health… we inform the chief, he then call for a community meeting. So women come and we…. on the meeting we agree as we do in our group to go door to door inviting them and informing them as we see when delivering, about how our maternal health is". [FGD1.p5] "when the group conducts the meeting, when the chief has ordered he come to explain. Then we explain to the people and they understand. Hence we usually come together with many people at the meetings, and they stay with us and listen to what we do." [FGD1.p12] "Number 14, is there change.. anywhere where people have copied from you since you joined this group?" [Moderator] "I will not manage to answer" [FGD1.p14] "Thank you very much, he/she is saying he/she will not manage to answer, lets go to number 11.." [Moderator]
	Members telling other women	"they have seen us change because when we are encouraging them to listen to what we are saying, they are running to places where we are telling them go like the hospital." [FGD1.p11] "women who do not come here to the group, issues of maternal health we visit the villages and conduct meetings while explaining issues of good maternal health." [FGD2.p5] "we meet very well, and others they used to ask us saying what is there, and we were saying there is good maternal practice. So when we are in the groups we make sure that some others in the village we meet for a long time because they saw that previous and present maternal experiences are different. Now there are very good things." [FGD2.p2] "Currently we have observed a change and we have observed that the women are understanding. We visit them and encourage them that once their pregnancies are a month or two month old they should start going for antenatal clinics and as soon as they observe to have a problem they should visit the hospital." [FGD3.p1] "it was explained to us vey explicitly and we in return communicated the same to other people" [FGD3.p10] "Change is there though there were some people who were stubborn who did not buy the idea of going for neonatal clinics but when we visited them we told them to be visiting the hospital every month and that they should be going to the hospital and wait there a few days before delivery. We visit them encouraging them to continue making hospital visits and seeking help from the doctor whenever they have a physical problem. As it is a lot of people in our community understand that. " [FGD3.p1] "Being a group what we have learnt here will help us to persuade others to join this group and we will share with them what we learn here so that Malawi can progress" [FGD3.p1] "The benefit I see to have gotten from this group that we are able to advise those who have children. In my case I stopped bearing children and I always look at opportunities where I can advise others on how to go about helping others. The benefit I see is that I should advise those who need advice" [FGD3.p5]
	Others attracted to WG messages	"people are being attracted because of the maternal issues that they are very important when they are visited." [FGD2.p7] "some people when we meet them they ask how things are going on at the groups. Then we see them coming when we are meeting which shows that they are happy with it." [FGD2.p11] "yes, they wish if they could participate." [FGD2.p6] "others they admire but most are joining the group." [FGD2.p1] "Those who have not yet joined us admire to join us" [FGD3.p1]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"when we meet we also call the whole village, all men. So as the story is being speculated in the village it has also changed the other villages." [FGD5.p1]
	other women are able to understand	"they are able to understand because nowadays most women they are able to practice the way that we are doing that they should deliver at the hospital" [FGD2.p5] "Initially we felt it was difficult, like everything when you are starting it seems difficult. But we realized that it is a very good thing and even received by more people." [FGD5.p1]
	others haven't grasped the message	"we find that we have done things that they are scarce and they are they are able to say that others have failed with what is happening and what we are doing as examples." [FGD1.p12]
	Through MaiKhanda working in other villages	"Like the surrounding villages, it looks like things have changed that we don't hear that a woman has miscarried or delivered on the way because the agents are teaching us. Aah we don't hear that rumour because of our agents, as they are going to all our surrounding villages." [FGD5.p10] "our agents are moving through this whole area, they have developed groups." [FGD5.p1]
Attitudes of non-members towards MaiKhanda	***Bad***	"I have been listening to what people have been saying, 'they are just labouring, maternal what, don't we deliver at TBAs? Aren't we having children? And there Maikhanda is coming, Maikhanda what?' I have heard." [FGD1.p10] "other people you are telling them about this group, they respond rudely to an extent of quarrelling. Yes we see that as a main challenge." [FGD1.p4] "On the problem you are experiencing that you were explaining, how did you resolve it?" [Moderator] "the problem we are facing, we only reported to the group but the group did not go there." [FGD1.p4]
	Was bad now good	"When we started meeting, others were showing weakness as they were frequently getting absent because they didn't consider it important. But now we are all meeting properly because they have realized the importance of Maikhanda, because they have thought us a lot of things." [FGD5.p6] "It was like, when the organization just came; she didn't know what we were doing in the groups. So she used to think what we were doing was just a waste of time when we were telling the women. So things came to the point when the hospital and other organizations started assisting us, telling us how we can control our maternal experience to reduce the problems we have been facing. so when she started seeing that things have started to change" [FGD6.p1] "We called them as a group and sat them down individually asking them questions, so everyone would answer personally that 'I would just stay because I would put it off' and others would say they have returned to the group." [FGD5.p8] "Women whom we don't meet they are benefiting indeed because they understood what we said. At first they thought we were doing useless things, but later they realized it was useful since everybody in this village delivers at the hospital. Whenever she is pregnant, she goes to the hospital to get…. Everybody in this village is changed indeed." [FGD6.p7]
	No problems	"concerning people in around this area, have you met any problem?" [Moderator] "no" [FDG1] "nothing?" [Moderator] "mmh" [FGD1]
	Assist the group	"we did not meet any problem since the coming of good maternal practice because we are seeing that all is well." [FGD2.p13] "they assist us because when they heard that the good maternal practice is here, we were conducting meetings together with them on things that we do in this village." [FGD2.p13]
Initial welcome of community to WG	***Welcoming***	"people from this area welcomed women groups, because when the group village headman calls for a meeting, all respective village headmen come together with their people in their multitude to the meeting to listen. When we discussed, they received/ welcomed the group and they sent their people men and women, we meet at the group to learn about this organization." [FGD1.p6] "they received it because in the previous days.. we were ignorant of good maternal practice, its advantages and disadvantages. Today they have seen that the previous and today's maternal practice are different. The difference is now the deaths are slowing down unlike in the past they were occurring often." [FGD2.p13]
	some stopped from joining by family	"there is a lot who would like to join this group, but what is stopping them is.., some in their families they are prevented from coming here but most are saying they wish to join this group." [FGD1.p13]
Husbands attitude to WG	***Difficult to join because of husband***	"It was hard because we are coming from different homes and men are so different that others will not let you to leave your home and household chores to join the groups but we still have worked hard... …We still seek permission to be attending these meetings" [FGD3.p1]
Important things concerning WG	***keeping the meeting time***	"Important things concerning women groups, firstly keeping the meeting time… ….keeping time is very important because it is what encourages the group for people.., or for a group when you do similar things because.. it doesn't take one who comes late to find himself asking his friends 'what was there'." [FGD1.p15]
	accepting each others ideas	"Important things concerning women groups... ..secondly aa.. Accepting each others ideas given to the group. ...accepting each other is very important because it builds unity, if you agree on a point it becomes a strong point when you accept each other first." [FGD1.p15]
	bicycle ambulance	"Important things concerning women groups... ...thirdly there is need for a bicycle ambulance... ...bicycle ambulance is important because when a woman is found to be expectant, her time is due, the bicycle could just take her and rush to the hospital." [FGD1.p15]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"the point of a bicycle ambulance will help us to.., when a woman is expectant, when her time is due while she is at home. She becomes weak. Hence while she is weak, she has no energy and her limbs have less energy to walk to the hospital. If the bicycle is available, men could carry her to the hospital. And she has a chance of receiving medical care early. Therefore she together with the baby could be saved." [FGD1.p6]
	hygiene	"people has changed starting from hygiene as well as delivery" [FGD1.p15]
	encourage going to the hospital	"Important things concerning women groups… ...fourthly encourage going to the hospital. ...this point is very important because.. in the past we used to see maternal and neonatal deaths, so.. it is very important for a woman to deliver at the hospital. This is its importance, they should deliver at the hospital because there is enough care." [FGD1.p15]
	Health Education	"They also learn health education which is guiding them on how they can live in their households." [FGD1.p15]
Understanding of Quality of Life ('good life') **('What do you consider to be a bad quality of life?')**	***Family planning/ child spacing***	"good life for our group means taking good care of one's body by not bearing children frequently where the cervix wears out but giving ample time to it so that it recuperates and functions properly during the subsequent birth" [FGD3.p5] "Reducing frequency in bearing children" [FGD3] "Bad life is where one is bearing children frequently" [FGD3.p6] "Bad life is when you cannot join your colleagues when they gather for group meetings and whenever they invite you say; how can I attend meetings with a child on my back, I am also pregnant and this little other one is sick and cannot walk on his own, who is going to stay with him a home and look after him or who can help me carry him so that I attend the group meeting. Such a person does not live a happy life, she is always grumbling; how can I join my friends at group meetings, they participate in group meetings and they work together. Living a separated life is not good." [FGD3.p6]
	Good Nutrition (self and children)	"Good life, like in my household I am supposed to take good care of myself is when I am able to take good care of my children; feed them well and being able to feed them well" [FGD3]
	Taking good care of yourself and others	"Good life, like in my household I am supposed to take good care of myself is when I am able to take good care of my children; feed them well and being able to feed them well" [FGD3] "good life is when you take good care of yourself" [FGD3] "I would like to concur with my colleague who has just spoken that good life entails one is able to take good care of herself, children and the husband." [FGD3.p6]
	Clean House	"Taking care of the household and your husband. The home is free from diseases when it is taken good care of" [FGD3.p3]
	Living as if you are not poor	"Not minding physical problems; 'I am very poor' The body is not healthy when you always think about how poor you are but rather you are supposed to live as if you are not poor but rich because being rich does not always mean having money" [FGD3.p3]
	Access to Healthcare	"Good life means one should go for clinics, when children are sick she should be able to take them to the hospital." [FGD3.p6]
	Being part of the Women's Group	"Good life also means one's ability to participate in group meetings where they discuss developmental issues… …When a woman attends meetings she has good life from the knowledge the women share whilst in groups." [FGD3.p6]
	Religious worship	"Good life also means... ..being able to remember your God and worship Him on the Sabbath day." [FGD3.p6]
	Not being confused	"We consider people who are confused as having a bad quality of life" [FGD7.p3]
	Not being stubborn	"What do you consider to be a bad quality of life?" [Moderator] "Stubborn persons… ...When there are such people in a group we evict them so that they do not destroy the group" [FGD7.p8 & p1]
	Good overall quotes explaining good and bad life	"I would like to concur with my colleague who has just spoken that good life entails one is able to take good care of herself, children and the husband. Good life means one should go for clinics, when children are sick she should be able to take them to the hospital. Good life also means one's ability to participate in group meetings where they discuss developmental issues and being able to remember your God and worship Him on the Sabbath day. When a woman attends meetings she has good life from the knowledge the women share whilst in groups. Bad life is where one is bearing children frequently and does not participate in group meetings. Bad life is when you cannot join your colleagues when they gather for group meetings and whenever they invite you say; how can I attend meetings with a child on my back, I am also pregnant and this little other one is sick and cannot walk on his own, who is going to stay with him a home and look after him or who can help me carry him so that I attend the group meeting. Such a person does not live a happy life, she is always grumbling; how can I join my friends at group meetings, they participate in group meetings and they work together. Living a separated life is not good. The goodness with gatherings is that you live a happy life. Mostly the group meetings make you free and happy, that is good life" [FGD3.p6]
Unprompted answers on what good/bad QoL is:	***Hygiene***	"Quality life like to strengthen the group, since through Maikhanda that taught us good behaviour, just like when we are home the house is supposed to be clean, water should be clean as well as toilets. " [FGD5.p9] "good behaviour to take care of ourselves, our homes should be clean as well as our food should be clean." [FGD5.p10] "Cleanliness like cleaning, sweeping… cleaning the house properly and everything should be clean. Those things should be clean and therefore you should also have a good quality life. However you cannot have a good quality life if you are not hygienic. But Maikhanda has taught us all those things. That is why we good quality life coming from Maikhanda." [FGD5.p10]

THEMES (alternative wording)	SUB-THEMES (Specifics)	QUOTES [id] {my comments}
		"The other good quality of life that Maikhanda has prompted us is; there are rubbish pits at home, bathroom, toilet, toilet and a house. Those things make the home to have good quality life because you do anything according to that way: you take the garbage to the rubbish pit when you want to get rid of it, you get into the toilet when you want to go the toilet, you use the bathroom when you want to bath, you go into the house when you want to stay in the house. Unlike the past before we realized about quality of life we used to throw the water anywhere; food remains just throw them behind the house; scraps just push them beside the veranda. However we have now learnt that a home needs a garbage pit " [FGD5.p2]
		"Those with low quality life their homes are unhygienic, their children not tidy that is why most of us we say this one…." [FGD5.p7]
		"Unhygienic home.. 1. Sweeping, mud floor shining, as well as… if you have a house that can be mopped, you should mop frequently. The sweeping, you should really be sweeping that is why we are saying good quality life." [FGD5.p7]
	Provide for families/ Have things in the household	"Everything should be available whether you talk of kitchen, toilet and everything. Anyone who fails to do that should be fined. " [FGD5.p9]
		"the house shouldn't lack anything since if you are all alright at the household we therefore say there is good quality life." [FGD5.p6]
		"when you have other important things to a human life you demonstrate that you have a good quality life." [FGD5.p10]
	Having Livestock	"When they have livestock at the house, a good house therefore they have a quality life." [FGD6.p7]
	Food available	"you should have food at your household" [FGD5.p10]
		"The house with low quality life… ...they have inadequate food" [FGD5.p5]
		"on the part of food availability, they are short of food on the household and when we see we say they have no high quality life because of those things; illness and short supply of food." [FGD5.p6]
	(good variety of food/nutrition)	"and the food should be a variety. Whenever there is a chance vegetables, beans and appetizing (like meat) should taken. Therefore there is good quality life without any problem." [FGD5.p2]
		"A person with quality life... ...eats a balanced diet at his/her household." [FGD6.p7]
	(lack of energy)	"The kind of life hard because there is no food, children are frequently ill and yourself you don't have energy." [FGD5.p5]
	Healthy living	"You need to be a health person... ...As you are eating properly and there is no illnesses. So we say there is good quality life instead of the presence of other things…" [FGD5.p6]
	(not getting sick frequently)	"the other good quality life is not getting sick frequently." [FGD5.p9]
		"The house with low quality life children are frequently sick" [FGD5.p5]
		"they have no high quality life because of those things; illness and short supply of food." [FGD5.p6]
	(HIV testing)	"Having good quality life at Maikhanda group is testing your blood" [FGD5.p10]
	Family planning	"When we deliver this year, we start parenting. Family planning is protecting us to have flexible families that do not reproduce every year. It was possible that you could meet (met) with the husband when you were not injecting [Depo] and that was another conception. And that is another child hasn't started to sit yet while you are four months pregnant. Therefore when the child starts to sit if he/she is growing you have another baby. When you start parenting this child that means another conception, so the family appeared to have low quality life. but now we are able to see good quality life because of family planning, following advice we are learning from our organization, Maikhanda." [FGD5.p2]
		"we see women having a good quality life because they are not delivering frequently" [FGD5.p1]
		"Taking injections or surgical contraception (surgical sterilization)" [FGD6.p8]
	Good maternal practice/delivering at hospital not TBA	"when we go to TBA or deliver at the village we see that we cannot have good quality life, a person is disturbed as we get to the hospital too late. But when we rush to the hospital, the doctors receive us properly and we appreciate that we will have higher quality life because Maikhanda came. We are living an upper quality life because we have realized the importance of good maternal practice." [FGD5.p1]
	Dressing well	"A person with quality life dresses well" [FGD6.p7]

Appendix N

Quality of life supplementary analyses

This appendix contains details of the supplementary analyses undertaken *en route* to the final multivariate model specifications determining the effect of women's groups on quality of life as measured by WHOQoL-BREF domain and facet scores. It begins with a discussion of the unadjusted scores and t-tests of the differences between them, as detailed in Table 4.2 on page 90. It then moves on to discuss multivariate regressions of the quality of life domain scores with socio-demographic variables, and socio-demographic variables and interviewer effects, for comparisons of all three study arms, and comparisons of villages with women's groups in them (members and controls) with control villages.

N.1 Unadjusted analyses

The mean physical domain score was less in non-members (61.9) than members (67.2) or controls (68.1) with the statistical significance of the difference between members and non-members still 5% significant after correcting for multiple hypothesis testing, and the difference between non-members and controls more significant (Table 4.2 on page 90). Within the physical domain the pain facet (q3) was found to be significantly higher (less pain) in women's group members (3.89) than control women (4.24; adjusted sig. $p<0.05$); the dependence on medicine facet (q4) was found to be significantly better in women's group members (3.55) than non-members (2.97; adjusted sig. $p<0.01$), and in controls (3.36) than non-members (2.97; adjusted sig. $p<0.05$); women's group members scored better on the energy facet (q10, 3.79) than non-members (3.39, adjusted sig. $p<0.05$); and controls scored significantly better (3.78) than non-members (3.40) on the sleep facet (q16, adjusted sig. $p<0.01$; Table 4.2).

The mean psychological domain score was higher on average in the WG members (69.8) than non-members in the same village (63.4; $p=0.0018$, adjusted sig. = $p<0.05$) and the control village women (64.5; $p=0.0055$; adjusted sig. = $p<0.05$; Table 4.2). Within the psychological domain the concentration score (facet q7) was found to be significantly higher in WG members

(4.24) than non-members (3.78, adjusted sig. $p<0.001$) and controls (3.85, adjusted sig. $p<0.01$). The life meaning facet (q6) was found to be higher in women's group members (3.72) than non-members (3.34; adjusted sig. $p<0.05$). The satisfaction with bodily appearance facet (q11) was also found to score higher in women's group members (3.79) than non-members (3.45; adjusted sig. $p<0.05$) or controls (3.39; adjusted sig. $p<0.05$; Table 4.2) and the self satisfaction facet (q19) was found to be significantly higher in women's group members (3.98) than controls (3.63; adjusted sig. $p<0.05$; Table 4.2).

The mean social relationships domain score was higher on average in the WG members (70.8) than control women (64.6; adjusted sig. $p<0.05$), and was also higher than non-members in the same village (66.4) though not significantly so after adjusting for multiple hypothesis testing; Table 4.2). Within the social domain the relationships facet (q20) was found to be significantly higher in women's group members (4.16) than non-members (3.89; adjusted sig. $p<0.05$) and controls (3.76; adjusted sig. $p<0.01$). We did not observe any difference in the support facet (q22) between comparison groups.

The mean environment domain score is higher on average in the WG members (55.6) than non-members in the same village (51.2; adjusted sig. $p<0.05$) and the control village women (50.7; adjusted sig. $p<0.05$; Table 4.2). Within the environment domain the q12 money (wg (1.82) > control (1.39); non (1.85) > control (1.39)) and q13 information (wg (2.85) > control (2.25); non (2.80) > control (2.25)) facets were found to be significantly different between study arms. Given that the scores for both of these were roughly equal in the wg and non study arms, which are located in the same village, and lower in the control study arm, it could be possible that the differences are due to independent village-level effects rather than any effect of the WG. WG members scored higher on average (3.69) than non-members (3.25), but not control women (3.56) on the healthy environment facet (q9 adjusted sig. $p<0.01$), and also scored significantly higher on the security facet (q8; 3.89) than non-members (3.50; adjusted sig. $p<0.05$; Table 4.2). Although a possible effect of women's groups by virtue of the WG strategies of improving access to health centres via bicycle ambulances and community transport funds, we found no difference in health services access (q24) scores between study arms. Perception of access and actual ease of access are obviously different things, however, as are the distances to the nearest health centre from each sampled village (although the villages in each study arm were selected randomly).

The mean overall quality of life domain (q1) score was found to be higher in the control women (3.64) than the WG members (3.17; adjusted sig. $p<0.01$) and non-members in the same village (3.02; adjusted sig. $p<0.001$; Table 4.2). There were found to be no significant differences in mean overall health facet (q2) scores between the three study arms (Table 4.2). All of these differences in scores were unadjusted for differences in socio-demographic variables, and more importantly, interviewer effects. See § 4.2.3 on page 89 for the fully adjusted analyses.

N.2 Multivariate Analyses

Associations between each of the domain scores and study arm, education, marital status, current illness and age were assessed by univariate regressions (Table N.1a). These were conducted

to show the individual relationships between each of the socio-demographic variables and each quality of life domain score so as to give the reader an idea of how the differences in respondent characteristics between study arms (Table 4.1) translate into the coefficients of the multivariate regressions, in particular those denoting the associations between study arm and the quality of life domain scores, adjusted for these differences. Notable associations include physical domain, psychological domain, overall quality of life and health domain scores deteriorating with age; physical and psychological domain scores being higher in those with tertiary education and psychological domain scores also being higher in those with primary or secondary education (relative to those with no education); all domain scores except overall health (q2) and the environmental domain (p=0.075) being significantly lower in those who have been widowed; the psychological, and social domains also being lower in those who are separated and those who are divorced; the 7 women living as married having lower overall quality of life domain scores (the lower health domain score for the single category only represents one woman); and all domain scores being significantly lower in those who reported current illness, as might be expected (Table N.1a). Many of these relationships are similar to those found in the pilot study of the Chichewa WHOQoL-BREF (§3).

The multivariate analyses with study arm and socio-demographic variables (Table N.1b) show that the significant differences in domain scores between study arms identified by the t-tests (Table 4.2) and equivalent univariate regressions (Table N.1a) all remain after controlling for those socio-demographic variables also found to still be significantly associated with the domain score after building the restricted multivariate model. In the restricted models, age remained only significantly associated with the health domain, and tertiary education was no longer associated with significantly-higher physical domain scores, but the associations between marital status and domain scores and between current illness and domain scores, were largely unchanged (Table N.1b).

The R^2 values for all of the regression models were fairly low meaning that the variation in each domain score was not well explained by the socio-demographic variables and the study arm variable alone. This is perhaps as expected, considering that many more factors are likely to influence an individual's quality of life than gender, age, education, marital status and membership of, or proximity to, a women's group. Possible effects of the women's groups on quality of life are discussed below.

Including random effects by village does not affect the significance of the results, with the regression coefficients typically varying less than 5% (data not shown). This was despite the average value of the coefficient of variation for the domain scores, k, being 0.15 - slightly higher than that used from the pilot study (0.11) used in the sample size calculations (see §4.1.2.1). Perhaps this is due to the variation between clusters having a balanced rather than either a left or right skewed distribution, meaning that the differences between clusters largely cancelled each other out in the random effects regression analyses.

However, including interviewer as an explanatory variable, we find that most of the significant differences in domain scores between comparison groups disappear (Table N.2). Relative to interviewer 1, who was the most experienced, interviewer 2 and interviewer 5 score lower on

Table N.1: Regressions of respondent characteristic variables on quality of life domain scores

a) Univariate Regressions (separate regr. for each variable)	Physical domain (0-100 scale)		95%CI		Psychological domain (0-100 scale)		95%CI		Social domain (0-100 scale)		95%CI		Environmental domain (0-100)		95%CI		Overall domain (q1; 1-5 scale)		95%CI		Health domain (q2; 1-5 scale)		95%CI	
Independent variable	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Study Arm: Reference=Control																								
WG members	-0.9	0.685	-5.0	3.3	**5.4**	**0.005**	**1.6**	**9.2**	**6.2**	**0.005**	**1.8**	**10.6**	**4.9**	**0.006**	**1.4**	**8.4**	**-0.47**	**2E-04**	**-0.71**	**-0.23**	-0.07	0.560	-0.30	0.16
non-members in the same village	**-6.2**	**0.004**	**-10.4**	**-2.0**	-0.8	0.681	-4.6	3.0	1.8	0.429	-2.6	6.2	0.5	0.777	-3.0	4.0	**-0.62**	**8E-07**	**-0.86**	**-0.37**	-0.10	0.384	-0.33	0.13
Education: Reference=None																								
Primary	2.2	0.351	-2.4	6.8	**5.5**	**0.009**	**1.4**	**9.7**	2.6	0.288	-2.2	7.5	1.9	0.329	-2.0	5.8	0.20	0.143	-0.07	0.47	0.05	0.702	-0.20	0.30
Secondary	0.4	0.852	-4.2	5.1	***5.2***	***0.016***	***1.0***	***9.5***	0.5	0.831	-4.4	5.5	1.7	0.415	-2.3	5.6	0.02	0.883	-0.26	0.30	-0.10	0.431	-0.36	0.15
Tertiary	***7.3***	***0.030***	***0.7***	***13.8***	**13.1**	**2E-05**	**7.2**	**19.0**	2.2	0.528	-4.7	9.2	2.7	0.349	-2.9	8.2	0.24	0.218	-0.14	0.63	0.25	0.179	-0.11	0.61
No answer	1.9	0.893	-26.2	30.1	-2.8	0.792	-23.6	18.0	9.1	0.464	-15.3	33.6	-8.1	0.420	-27.7	11.6	-0.18	0.795	-1.55	1.19	0.58	0.369	-0.69	1.85
Marital Status: Reference=Married																								
Single	-16.6	0.401	-55.5	22.3	-29.7	0.104	-65.6	6.1	-27.6	0.187	-68.5	13.4	-15.7	0.355	-49.1	17.7	-1.37	0.241	-3.67	0.92	***-2.78***	***0.012***	***-4.95***	***-0.62***
Living as Married	12.5	0.0991	-2.4	27.3	1.2	0.86	-12.4	14.9	-6.1	0.441	-21.7	9.5	6.1	0.343	-6.6	18.8	**-1.66**	**2E-04**	**-2.53**	**-0.79**	0.50	0.230	-0.32	1.33
Separated	-2.1	0.723	-13.4	9.3	***-11.7***	***0.029***	***-22.1***	***-1.2***	***-15.1***	***0.014***	***-27.0***	***-3.1***	-9.5	0.0566	-19.3	0.3	-0.21	0.547	-0.88	0.47	-0.12	0.719	-0.75	0.52
Divorced	-0.3	0.933	-6.8	6.3	***-6.2***	***0.043***	***-12.3***	***-0.2***	**-13.4**	**2E-04**	**-20.3**	**-6.5**	-3.7	0.194	-9.4	1.9	-0.35	0.080	-0.73	0.04	-0.18	0.341	-0.54	0.19
Widowed	**-17.3**	**6E-06**	**-24.7**	**-9.8**	***-8.8***	***0.011***	***-15.5***	***-2.0***	***-9.6***	***0.015***	***-17.4***	***-1.9***	-5.7	0.0751	-12.0	0.6	**-0.67**	**0.002**	**-1.10**	**-0.24**	-0.05	0.813	-0.46	0.36
Ill: Reference category=not ill	**-11.6**	**5E-09**	**-15.4**	**-7.8**	**-6.2**	**7E-04**	**-9.8**	**-2.6**	***-4.3***	***0.041***	***-8.4***	***-0.2***	**-6.7**	**7E-05**	**-10.0**	**-3.4**	**-0.58**	**6E-07**	**-0.81**	**-0.36**	**-0.6**	**2E-07**	**-0.8**	**-0.4**
Age (years)	**-2.06**	**0.005**	**-0.35**	**-0.06**	***-0.16***	***0.015***	***-0.29***	***-0.03***	-0.07	0.398	-0.22	0.09	-0.087	0.164	-0.209	0.035	**-0.013**	**0.002**	**-0.022**	**-0.005**	**-0.014**	**7E-04**	**-0.021**	**-0.006**
Age²	**-0.0026**	**0.003**	**-0.0043**	**-0.0009**	***-0.0172***	***0.029***	***-0.0033***	***0.0002***	-0.0007	0.472	-0.0024	0.0011	-0.0010	0.166	-0.0025	0.0004	**-0.0002**	**0.002**	**-0.0003**	**-0.0001**	**-0.0002**	**6E-04**	**-0.0003**	**0.0001**
b) Multivariate Restricted models[a]																								
Study Arm: Reference=Control																								
WG members	0.9	0.676	-3.2	4.9	**6.9**	**4E-04**	**3.1**	**10.6**	**7.6**	**7E-04**	**3.2**	**12.0**	**6.0**	**9E-04**	**2.4**	**9.5**	**-0.33**	**0.007**	**-0.57**	**-0.09**	0.04	0.704	-0.19	0.28
non-members in the same village	***-4.8***	***0.019***	***-8.85***	***-0.80***	1.2	0.519	-2.5	5.0	3.4	0.128	-1.0	7.7	1.57	0.378	-1.9	5.1	**-0.53**	**1E-05**	**-0.77**	**-0.29**	0.01	0.933	-0.22	0.24
Education: Reference=None																								
Primary					4.0	0.0528	0.0	8.1													-0.04	0.779	-0.29	0.21
Secondary					3.9	0.066	-0.3	8.1													***-0.27***	***0.049***	***-0.53***	***0.00***
Tertiary					**11.1**	**2E-04**	**5.3**	**17.0**													0.01	0.960	-0.36	0.38
No answer					-2.2	0.832	-22.6	18.2													0.60	0.338	-0.63	1.83
Marital Status: Reference=Married																								
Single	-20.6	0.282	-58.2	17.0	-28.7	0.106	-63.5	6.1	-25.4	0.219	-65.9	15.2	-15.1	0.363	-47.8	17.6	-1.79	0.112	-3.99	0.42	***-2.90***	***0.007***	***-5.01***	***-0.80***
Living as Married	8.4	0.253	-6.0	22.9	-3.3	0.629	-16.7	10.1	-10.9	0.168	-26.5	4.6	1.4	0.826	-11.2	14.0	**-1.72**	**8E-05**	**-2.56**	**-0.87**	0.42	0.305	-0.39	1.23
Separated	-2.5	0.653	-13.5	8.5	***-11.5***	***0.027***	***-21.6***	***-1.3***	**-15.9**	**0.008**	**-27.8**	**-4.1**	***-10.3***	***0.034***	***-19.9***	***-0.8***	-0.20	0.546	-0.84	0.45	-0.11	0.732	-0.72	0.51
Divorced	0.2	0.944	-6.1	6.6	-4.9	0.110	-10.8	1.1	**-13.4**	**1E-04**	**-20.3**	**-6.5**	-3.7	0.194	-9.2	1.9	-0.31	0.104	-0.68	0.06	-0.21	0.26	-0.57	0.15
Widowed	**-15.9**	**2E-05**	**-23.2**	**-8.7**	***-7.8***	***0.022***	***-14.5***	***-1.1***	**-10.5**	**0.007**	**-18.2**	**-2.8**	-6.0	0.060	-12.2	0.3	***-0.51***	***0.016***	***-0.93***	***-0.09***	0.20	0.341	-0.22	0.62
Ill: Reference category=not ill	**-10.8**	**4E-08**	**-14.5**	**-7.0**	**-6.3**	**4E-04**	**-9.8**	**-2.8**	***-5.2***	***0.012***	***-9.3***	***-1.2***	**-7.1**	**2E-05**	**-10.4**	**-3.9**	**-0.56**	**1E-06**	**-0.78**	**-0.34**	**-0.5**	**2E-06**	**-0.7**	**-0.3**
Age (years)																					**-0.014**	**0.002**	**-0.023**	**-0.005**
Age²																								
R^2		0.115				0.103				0.076				0.068				0.128				0.094		

p<0.05 **p<0.01** **p<0.001** E=exponent (base 10) e.g. 2E-06 = 2 x 10^{-6}

[a] Restricted model after starting with all socio-demographic variables and removing those p>0.1 signficant

most domains (univariate regressions of interviewer against each domain score: Table N.2a) and even within each study arm (data not shown). Therefore, when 'interviewer' is included as a variable within the multivariate analyses, the previously significant associations showing women's group members to have higher psychological and environmental domain scores and lower overall quality of life scores than the control area women, wash out (Table N.2b). The same is true for the significant associations showing the non-members to have lower physical and overall quality of life domain scores that the control area women, which also disappear. The only significant association remaining is that indicating that the women's group members have higher social domain scores. This is accompanied by a new significant association showing the women's group members to have lower physical domain scores than the control area women, controlling for socio-demographic variables and interviewer effects (Table N.2b). The problem of interviewer effects has been noted before in other studies in similar settings (see e.g. Borghi and Jan, 2008).

Comparing models estimating the difference in quality of life domain scores between the control area women and the respondents in the women's group villages (women's group members and non-members combined), and between the control areas and each of the women's group members and non-members separately, can shed light on the associations between women's group membership and the domain scores. For each quality of life domain score, Table N.2 shows the results of three pairs of these regressions: the first without any other independent variables added (Table N.2a); the second adjusted for socio-demographic variables in restricted multivariate regressions using the methods detailed earlier (Table N.2b); and the third being extensions of the second that include interviewer as an additional independent variable (Table N.2c). The notation of the regression equations introduced and explained in §4.1.4.1 has been added in blue text to the table for clarity. Going from the top to the bottom of each column of the table, the regression equations increase in complexity, and more of the variation in domain score is explained by the model, as indicated by their increasing R^2 values. Nevertheless, as noted above, none of these models have very high R^2 values, meaning that unknown omitted variables and interaction- or other higher-order- terms subsumed within the error term ϵ still predominantly explain the observed variation in domain scores.

Table N.2 shows that in general the βx_{wg+non} coefficients are approximately halfway between the βx_{wg} and βx_{non} coefficients as would be expected given the former is made up of approximately equal numbers of each of the latter groups, which each have sample sizes large enough for sufficient statistical precision of 179 and 175 respondents each. For the physical domain, women's group members had statistically identical scores compared to control area women when accounting for socio-demographic differences, but not when accounting for interviewer effects, which resulted in the women's group members having significantly lower scores on average. Non-members, conversely, had significantly lower physical domain scores than control area women when adjusting for socio-demographic variables, but not when interviewer was included in the model. For the psychological and environmental domains, women's group members had significantly higher scores compared to control area women when accounting for socio-demographic differences, but not when accounting for interviewer effects; and non-members had statistically

Table N.2: Regressions of respondent characteristic variables on quality of life domain scores adjusted for interviewer effects

a) Univariate Regressions (separate regr. for each variable)	Physical domain (0-100 scale) 95%CI				Psychological domain (0-100 scale) 95%CI				Social domain (0-100 scale) 95%CI				Environmental domain (0-100) 95%CI				Overall domain (q1; 1-5 scale) 95%CI				Health domain (q2; 1-5 scale) 95%CI			
Independent variable	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper	Coef.	p>|t|	lower	upper
Interviewer: Ref. cat.=Interviewer 1																								
Interviewer 2	**-20.8**	**0**	**-24.3**	**-17.2**	**-9.5**	**2E-07**	**-13.0**	**-6.0**	**-5.9**	**0.006**	**-10.2**	**-1.7**	**-8.3**	**4E-07**	**-11.5**	**-5.1**	**-0.70**	**7E-10**	**-0.92**	**-0.48**	***-0.29***	***0.011***	***-0.51***	***-0.07***
Interviewer 3	-1.5	0.477	-5.8	2.7	4.1	0.0575	-0.1	8.3	1.0	0.706	-4.0	6.0	**7.2**	**2E-04**	**3.4**	**10.9**	**-1.33**	**0**	**-1.59**	**-1.07**	0.02	0.872	-0.24	0.28
Interviewer 4	**-11.7**	**0.002**	**-18.9**	**-4.5**	0.3	0.930	-6.8	7.4	7.4	0.095	-1.3	16.0	***7.7***	***0.018***	***1.3***	***14.2***	-0.28	0.209	-0.72	0.16	-0.29	0.197	-0.74	0.15
Interviewer 5	**-16.0**	**1E-04**	**-24.1**	**-8.0**	**-11.4**	**0.006**	**-19.5**	**-3.3**	1.1	0.825	-8.4	10.6	**-12.3**	**8E-04**	**-19.4**	**5.1**	**-0.74**	**0.003**	**-1.23**	**-0.25**	-0.12	0.629	-0.62	0.37
b) Multivariate Restricted models[a]																								
Study Arm: Reference=Control																								
WG members	**-6.2**	**0.002**	**-10.1**	**-2.4**	2.1	0.289	-1.8	6.2	***5.3***	***0.032***	***0.5***	***10.1***	0.1	0.973	-3.7	3.6	-0.20	0.108	-0.44	0.04	-0.05	0.675	-0.30	0.20
non-members in the same village	-3.3	0.0906	-7.2	0.5	0.6	0.769	-3.4	4.6	2.8	0.260	-2.0	7.6	-0.8	0.652	-4.5	2.8	-0.15	0.244	-0.39	0.10	0.03	0.828	-0.22	0.28
Education: Reference=None																								
Primary	3.6	0.0622	-0.2	7.4	**5.7**	**0.005**	**1.7**	**9.6**																
Secondary	2.3	0.247	-1.6	6.2	**6.0**	**0.004**	**1.990**	**10.1**																
Tertiary	**8.2**	**0.003**	**2.7**	**13.7**	**14.3**	**9E-07**	**8.7**	**20.0**																
No answer	12.7	0.281	-10.4	35.9	7.2	0.476	-12.6	26.9																
Marital Status: Reference=Married																								
Single	-8.3	0.613	-40.6	24.0	-24.2	0.155	-57.5	9.2	-22.8	0.269	-63.2	17.7					-1.43	0.172	-3.48	0.63	***-2.89***	***0.007***	***-4.98***	***-0.81***
Living as Married	3.0	0.644	-9.7	15.7	-8.9	0.182	-22.0	4.2	-11.3	0.161	-27.2	4.5					***-1.06***	***0.010***	***-1.87***	***-0.25***	0.24	0.558	-0.58	1.06
Separated	-0.3	0.942	-9.8	9.1	***-9.6***	***0.054***	***-19.4***	***0.2***	***-15.4***	***0.011***	***-27.3***	***-3.6***					-0.31	0.305	-0.92	0.29	-0.15	0.619	-0.76	0.46
Divorced	0.9	0.741	-4.6	6.5	-4.3	0.142	-10.0	1.4	**-13.2**	**2E-04**	**-20.0**	**-6.3**					-0.32	0.069	-0.67	0.02	-0.17	0.352	-0.52	0.19
Widowed	**-15.4**	**2E-06**	**-21.6**	**-9.1**	***-7.4***	***0.023***	***-13.8***	***-1.0***	**-10.3**	**0.008**	**-18.0**	**-2.7**					***-0.43***	***0.030***	***-0.82***	***-0.04***	0.26	0.227	-0.16	0.67
Ill: Reference category=not ill	**-11.3**	**0**	**-14.6**	**-8.0**	**-5.9**	**7E-04**	**-9.3**	**-2.5**	***-5.0***	***0.016***	***-9.1***	***-0.9***	**-6.2**	**1E-04**	**-9.3**	**-3.1**	**-0.62**	**1E-08**	**-0.83**	**-0.41**	**-0.5**	**9E-08**	**-0.8**	**-0.3**
Age (years)																					**-0.015**	**7E-04**	**-0.023**	**-0.006**
Interviewer: Ref. cat.=Interviewer 1																								
Interviewer 2	-22.7	0	-26.3	-19.2	**-9.6**	**4E-07**	**-13.3**	**-5.9**	***-5.0***	***0.024***	***-9.4***	***-0.7***	**-8.5**	**1E-06**	**-11.8**	**-5.1**	**-0.74**	**2E-10**	**-0.96**	**-0.52**	**-0.39**	**8E-04**	**-0.62**	**-0.16**
Interviewer 3	0.8	0.705	-3.5	5.2	***5.1***	***0.025***	***0.7***	***9.6***	0.1	0.985	-5.4	5.5	**7.2**	**6E-04**	**3.1**	**11.2**	**-1.20**	**0**	**-1.48**	**-0.93**	-0.01	0.933	-0.29	0.27
Interviewer 4	**-12.3**	**5E-04**	**-19.2**	**-5.3**	-1.5	0.674	-8.7	5.6	3.5	0.429	-5.2	12.3	6.4	0.0568	-0.2	13.0	-0.38	0.086	-0.82	0.05	-0.47	0.0375	-0.92	0.03
Interviewer 5	**-13.3**	**7E-04**	**-21.0**	**-5.7**	**-10.9**	**0.008**	**-19.0**	**-2.8**	1.7	0.733	-7.9	11.3	**-11.3**	**0.003**	**-18.6**	**-3.9**	***-0.59***	***0.018***	***-1.07***	***-0.10***	-0.12	0.626	-0.62	0.37
R^2		0.363				0.187				0.090				0.168				0.251				0.108		

p<0.05 **p<0.01** **p<0.001** E=exponent (base 10) e.g. 2E-06 = 2 x 10^{-6}

[a] Restricted model after starting with all socio-demographic variables and removing those p>0.1 signficant

indistinguishable scores to control area women in all comparisons. For the social domain, women's group members had significantly higher scores compared to control area women when accounting for socio-demographic differences and also when accounting for interviewer effects; and non-members again had statistically indistinguishable scores to control area women in all comparisons. For the overall domain, both the women's group members and non-members had significantly lower scores than the control area women when socio-demographic variables were accounted for, but both of these associations disappeared when interviewer effects were also added to the model. For the health domain there were no significant differences observed between the study arms in any of the comparisons (Table N.2). It should be noted here that we cannot rule out the possibility that the quality of life domain scores are endogenous to the women's group members, i.e. it is possible that any of the observed significant differences in quality of life domain scores between the study arms are pre-existing rather than a result of the women's group intervention (see §4.2.3). Therefore these results are inconclusive and are not able to provide an answer to the question of whether women's groups improve quality of life.

Table N.3: Regressions of village and study arm on quality of life domain scores, unadjusted, adjusted for respondent characteristics, and adjusted for respondent characteristics and interviewer effects

	Physical domain Y_{phys} (0-100 scale)				Psychological domain Y_{psych} (0-100 scale)				Social domain Y_{social} (0-100 scale)				Environmental domain Y_{envir} (0-100 scale)				Overall domain $Y_{overallQoL}$ (q1; 1-5 scale)				Health domain Y_{health} (q2; 1-5 scale)			
			95%CI				95%CI				95%CI				95%CI				95%CI				95%CI			
Independent variable	β	p>|t|	lower	upper	β	p>|t|	lower	upper	β	p>|t|	lower	upper	β	p>|t|	lower	upper	β	p>|t|	lower	upper	β	p>|t|	lower	upper
a) Univariate Regression																								
Study Arm: Reference (α) = *Control*	$Y_{phys} = \alpha + \beta x_{wg+non} + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg+non} + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg+non} + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg+non} + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg+non} + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg+non} + \varepsilon$			
WG members+non-members in same village combined: $x_{wg+non}=1$	-3.5	0.0568	-7.1	0.1	2.3	0.169	-1.0	5.6	***4.0***	***0.039***	***0.2***	***7.8***	2.7	0.0789	-0.3	5.8	**-0.54**	**5E-07**	**-0.75**	**-0.33**	-0.08	0.401	-0.28	0.11
R^2		0.007				0.004				0.008				0.006				0.046				0.001		
Study Arm: Reference (α) = *Control*	$Y_{phys} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg} + \beta x_{non} + \varepsilon$			
WG members: $x_{wg}=1$, $x_{non}=0$	-0.9	0.685	-5.0	3.3	**5.4**	**0.005**	**1.6**	**9.2**	**6.2**	**0.005**	**1.8**	**10.6**	**4.9**	**0.006**	**1.4**	**8.4**	**-0.47**	**2E-04**	**-0.71**	**-0.23**	-0.07	0.560	-0.30	0.16
non-members in the same village: $x_{wg}=0$, $x_{non}=1$	**-6.2**	**0.004**	**-10.4**	**-2.0**	-0.8	0.681	-4.6	3.0	1.8	0.429	-2.6	6.2	0.5	0.777	-3.0	4.0	**-0.62**	**8E-07**	**-0.86**	**-0.37**	-0.10	0.384	-0.33	0.13
R^2		0.019				0.022				0.015				0.017				0.049				0.001		
b) Multivariate Restricted models[a]	$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{edu} + \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{edu} + \gamma z_{marital} + \gamma z_{il} + \gamma z_{age}$			
Study Arm: Reference ($\alpha + \gamma\mathbf{z}'$) = *Control + ref. soc-dem. categories*[b]	$Y_{phys} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \varepsilon$			
WG members+non-members in same village combined: $x_{wg+non}=1$	-2.0	0.262	-5.5	1.5	***4.0***	***0.016***	***0.8***	***7.3***	**5.5**	**0.005**	**1.7**	**9.2**	***3.7***	***0.016***	***0.7***	***6.8***	**-0.43**	**4E-05**	**-0.64**	**-0.23**	0.03	0.792	-0.17	0.23
R^2		0.102				0.088				0.070				0.057				0.123				0.094		
Study Arm: Reference=Control	$Y_{phys} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \varepsilon$			
WG members: $x_{wg}=1$, $x_{non}=0$	0.9	0.676	-3.2	4.9	**6.9**	**4E-04**	**3.1**	**10.6**	**7.6**	**7E-04**	**3.2**	**12.0**	**6.0**	**9E-04**	**2.4**	**9.5**	**-0.33**	**0.007**	**-0.57**	**-0.09**	0.04	0.704	-0.19	0.28
non-members in the same village: $x_{wg}=0$, $x_{non}=1$	***-4.8***	***0.019***	***-8.85***	***-0.80***	1.2	0.519	-2.5	5.0	3.4	0.128	-1.0	7.7	1.57	0.378	-1.9	5.1	**-0.53**	**1E-05**	**-0.77**	**-0.29**	0.01	0.933	-0.22	0.24
R^2		0.115				0.103				0.076				0.068				0.128				0.094		
b) Multivariate Restricted models with interviewer[c]	$\gamma\mathbf{z} = \gamma z_{edu} + \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{edu} + \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{ill}$				$\gamma\mathbf{z} = \gamma z_{marital} + \gamma z_{il} + \gamma z_{age}$			
Study Arm: Reference ($\alpha + \gamma\mathbf{z}'$) = *Control + ref. soc-dem. categories*[b]	$Y_{phys} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg+non} + \gamma\mathbf{z} + \zeta w + \varepsilon$			
WG members+non-members in same village combined: $x_{wg+non}=1$	**-4.8**	**0.006**	**-8.1**	**1.4**	1.4	0.438	-2.1	4.8	4.0	0.0619	-0.2	8.2	-0.4	0.782	-3.6	2.7	-0.17	0.114	-0.39	0.04	-0.01	0.910	-0.23	0.21
R^2		0.342				0.186				0.088				0.167				0.251				0.108		
Study Arm: Reference=Control	$Y_{phys} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{psych} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{social} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{envir} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{overallQoL} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$				$Y_{health} = \alpha + \beta x_{wg} + \beta x_{non} + \gamma\mathbf{z} + \zeta w + \varepsilon$			
WG members	**-6.2**	**0.002**	**-10.1**	**-2.4**	2.1	0.289	-1.8	6.2	***5.3***	***0.032***	***0.5***	***10.1***	0.1	0.973	-3.7	3.6	-0.20	0.108	-0.44	0.04	-0.05	0.675	-0.30	0.20
non-members in the same village	-3.3	0.0906	-7.2	0.5	0.6	0.769	-3.4	4.6	2.8	0.260	-2.0	7.6	-0.8	0.652	-4.5	2.8	-0.15	0.244	-0.39	0.10	0.03	0.828	-0.22	0.28
R^2		0.363				0.187				0.090				0.168				0.251				0.108		

p<0.05 **p<0.01** **p<0.001** E=exponent (base 10) e.g. 2E-06 = 2 x 10^{-6}

[a] Restricted model after starting with all socio-demographic variables ($z_{marital} + z_{edu} + z_{illness} + z_{age} + z_{age^2}$) and removing those whose γ coefficients were p>0.1 signficant. Data for socio-demographic variables ($\gamma\mathbf{z}$) not shown.

[b] Reference categories for socio-demographic variables are: $z_{marital}=z_{married}$; $z_{edu}=z_{none}$; $z_{illness}=z_{notill}$; $z_{age}=0$ $z_{age^2}=0$, which together comprise the vector $\gamma\mathbf{z}'$ containing those γz representing the socio-demographic variables remaining in the restricted multivariate model

[c] as [a] but also including interviewer (w) as a dummy variable

Appendix O

Associations between WHOQoL-BREF facets

Table N.1 details the results of the univariate regressions between all 27*26 combinations of the 27 quality of life facets recorded on the WHOQoL-BREF, for the main study sample (n=534, see §4). In the table the rows represent the variables treated as independent variables and the columns those regressed against them as dependent variables[1], significant associations are highlighted in darker shades of red[2], larger correlations are highlighted in darker shades of blue[3], and larger R^2 values are highlighted in darker shades of orange.[4] Almost all associations were positive, i.e. an increase in one facet being associated with an increase in the other (and therefore decreases being associated with decreases) and are therefore compatible with facets representing either fertile functionings or corrosive disadvantages (Wolff and De-Shalit, 2007) (see §2.1.5, §2.2.4, §2.3.1, §2.3.2). Associations that are highly ($p<0.00001$ equivalent) significant and have a high (>0.150) R^2 value, i.e. those with dark red and dark orange shading, are also bordered by a black box. The final two columns of the table contain the sum of the correlations of each facet with the others and the facets rank based on this sum, which is an indication of how relatively influential the facet is, i.e. how likely it is to be a 'fertile functioning' or 'corrosive disadvantage' (see § 4.1.4.2 on page 85). These rankings are summarised discussed with reference

[1] Although the regressions on either side of the diagonal of the table are essentially mirror images, e.g. q1 q2 and q2 q1, and have the same t-statistics and R^2 values, their coefficients are slightly different because of the different asymmetries in the distributions of each 1-5 scaled facet score.

[2] as explained in the footnotes of the 3-page table, the light-red shading correspondents to a t statistic with p-value <0.05, mid-red shading $p<0.001$ and dark-red shading $p<0.00001$, all assuming a two-tailed normal distribution and appropriate number of degrees of freedom (533 for the main study), and assuming the (conservative) Bonferonni correction - adjusting for 27*26 tests (all univariate combinations of the 27 WHOQoL-BREF quality of life facets)

[3] the cut-offs of greater than 0.200 change in the dependent facet (column) per change of 1.000 in the independent facet (row) for light-blue shading, greater than 0.300 for mid-blue shading, and greater than 0.400 for dark-blue shading are, like those for the p-values, somewhat arbitrary; nevertheless, I hope they are useful to distinguish the larger magnitude associations

[4] the cut-offs of greater than 0.050 (or 5% of the total variation in the independent (row) variable explained by variation in the dependent (column) variable) for light-orange shading, greater than 0.100 for mid-orange shading and greater than 0.150 for dark-orange shading, are also somewhat arbitrary, but given the range of R^2 values, I hope useful in order to distinguish between the more important associations.

to those derived from more sophisticated multivariate analyses in § 4.2.5 on page 100.

Repeating the regression analyses on the pilot sample (n=309; see §3), shows many of the associations between facets to be different (see Table N.2 for pilot study regression results and Table N.3 for the differences in results between the pilot and main study samples). Indeed the rankings of the facets, based on the sum of their significant correlations (see last columns of tables) are very different between the main study and pilot study samples: Kendall's rank correlation: $\tau = -0.0313$, $p = 0.996$. Facets much more significantly associated with other facets in the pilot study sample (n=309) than the main study sample (n=534), were: *q1 overall*, *q6 life meaning*, *q13 information* (out of all the differences in significance between the pilot and the main study for this facet all the significant associations were in the pilot study only), *q15 mobility*, *q20* relationships, and q26 *depression*. Whilst facets much less significantly associated with other facets in the pilot sample were: *q2 health*, *q10 energy* (out of all the differences in significance between the pilot and the main study for this facet all the significant associations were in the main study only), *q17 daily living activities*, *q18 work capacity* (for *q17* and *q18* all but one of the differences between the pilot and main study are that the main study only was significant). The facets that are highly correlated with many other facets in the pilot sample tend to have a greater number of highly significant and high R^2 associations with other facets than those in the main study sample, due to the higher R^2 values of the pilot sample in general. Indeed, in only 6/40 of the large differences in correlation, and 4/60 of the large difference in R^2 values between the 702 regressions from the main and the pilot samples, were the correlations and R^2 values, respectively, larger in the main sample, with the values larger in the pilot sample for the rest of the differences (Table N.3). Table N.4 contains the regression results for the combined pilot and main study samples (n=843).

The differences between the pilot and main study samples are discussed in §4.3.2 along with plans for further investigations. See §4.2.5 for presentation and discussion of the multivariate backward stepwise regressions for each of the 27 WHOQoL-BREF facets, and the Structural Equation Model, liking these multivariate regressions together.

Table N.1 Univariate regressions of each WHOQoL-BREF quality of life facet against each other (main study, n=534)

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q1 overall QoL	coef.		0.389	0.183	0.191	0.375	0.100	*0.201*	*0.244*	*0.263*	0.391	0.188	-0.001	-0.057	*0.203*	*0.209*	0.333	0.315	*0.280*	0.158	0.139	*0.203*	0.177	*0.270*	0.155	*0.242*	*0.236*	*0.263*	4.756	19
	l_95		0.317	0.097	0.087	0.297	0.011	0.127	0.159	0.175	0.300	0.093	-0.064	-0.151	0.112	0.125	0.253	0.241	0.206	0.086	0.064	0.116	0.090	0.186	0.075	0.157	0.146	0.172		
	u_95		0.461	0.268	0.295	0.453	0.190	0.275	0.329	0.351	0.482	0.283	0.061	0.037	0.295	0.293	0.412	0.389	0.353	0.230	0.214	0.290	0.265	0.354	0.235	0.326	0.327	0.354		
	t		10.64	*4.19*	3.62	9.42	2.21	5.36	5.63	5.90	8.44	3.90	-0.03	-1.19	*4.36*	4.89	8.22	8.36	7.47	*4.30*	3.63	*4.57*	3.98	6.34	3.79	5.62	5.12	5.69		
	R^2		0.175	0.032	0.024	0.143	0.009	*0.052*	*0.056*	*0.062*	0.118	0.028	0.000	0.003	0.035	0.043	0.113	0.117	*0.095*	0.034	0.024	0.041	0.029	*0.070*	0.026	*0.056*	0.047	*0.057*		
q2 Health	coef.	0.451		*0.229*	0.314	0.442	0.126	0.189	0.323	0.308	0.500	0.332	0.155	0.109	*0.203*	0.182	0.321	0.353	0.341	*0.260*	0.175	*0.202*	*0.254*	0.346	0.200	*0.234*	0.356	*0.265*	6.753	7
	l_95	0.368		0.137	0.204	0.359	0.029	0.109	0.233	0.214	0.405	0.233	0.089	0.008	0.105	0.091	0.234	0.274	0.264	0.185	0.094	0.108	0.161	0.257	0.114	0.143	0.261	0.167		
	u_95	0.534		0.320	0.423	0.524	0.222	0.269	0.413	0.401	0.596	0.432	0.221	0.211	0.302	0.273	0.408	0.432	0.419	0.336	0.256	0.297	0.347	0.435	0.286	0.325	0.452	0.363		
	t	10.64		4.90	5.61	10.48	2.56	*4.63*	7.03	6.45	10.29	6.55	*4.62*	2.12	*4.04*	3.92	7.26	8.78	8.63	6.77	*4.26*	*4.21*	5.36	7.66	*4.58*	5.04	7.34	5.30		
	R^2	0.175		0.043	*0.056*	0.172	0.012	0.039	*0.085*	*0.073*	0.167	*0.075*	0.039	0.008	0.030	0.028	*0.090*	0.127	0.123	*0.079*	0.033	0.035	*0.051*	*0.099*	0.038	0.046	*0.092*	*0.050*		
q3 Pain	coef.	0.175	0.189		0.539	0.128	0.005	0.059	0.075	0.120	*0.294*	0.131	0.040	-0.029	0.065	0.135	0.121	*0.269*	*0.248*	0.091	0.045	0.088	0.009	0.088	0.070	0.144	*0.225*	0.138	1.939	26
	l_95	0.093	0.113		0.447	0.046	-0.082	-0.016	-0.010	0.032	0.202	0.037	-0.021	-0.121	-0.026	0.052	0.039	0.195	0.176	0.019	-0.029	-0.003	-0.078	0.003	-0.009	0.060	0.136	0.047		
	u_95	0.257	0.265		0.631	0.210	0.093	0.133	0.161	0.208	0.386	0.224	0.101	0.064	0.156	0.219	0.203	0.343	0.321	0.162	0.119	0.179	0.096	0.172	0.150	0.229	0.314	0.229		
	t	*4.19*	4.90		11.52	3.07	0.12	1.55	1.73	2.68	6.28	2.75	1.29	-0.61	1.40	3.19	2.89	7.16	6.70	2.50	1.19	1.91	0.21	2.04	1.74	3.35	4.97	2.98		
	R^2	0.032	0.043		0.200	0.018	0.000	0.005	0.006	0.013	*0.069*	0.014	0.003	0.001	0.004	0.019	0.015	*0.088*	*0.078*	0.012	0.003	0.007	0.000	0.008	0.006	0.021	0.044	0.016		
q4 Medicine	coef.	0.126	0.178	0.370		0.017	0.002	0.126	0.120	0.186	0.328	0.162	0.068	-0.056	0.066	0.180	0.155	*0.252*	*0.246*	0.171	0.112	0.042	0.022	0.158	0.056	*0.220*	0.192	*0.226*	3.151	24
	l_95	0.057	0.116	0.307		-0.051	-0.070	0.066	0.049	0.114	0.255	0.085	0.018	-0.133	-0.009	0.112	0.088	0.192	0.187	0.113	0.051	-0.031	-0.050	0.089	-0.010	0.152	0.119	0.152		
	u_95	0.194	0.240	0.434		0.086	0.075	0.187	0.190	0.258	0.402	0.239	0.119	0.020	0.141	0.248	0.222	0.312	0.305	0.229	0.174	0.115	0.095	0.227	0.121	0.288	0.266	0.299		
	t	3.62	5.61	11.52		0.49	0.06	*4.09*	3.34	5.10	8.76	*4.13*	2.67	-1.44	1.72	5.20	*4.53*	8.26	8.20	5.83	3.62	1.13	0.61	*4.49*	1.67	6.36	5.13	6.03		
	R^2	0.024	*0.056*	0.200		0.001	0.000	0.031	0.021	0.047	0.126	0.031	0.013	0.004	0.006	0.049	0.037	0.114	0.113	*0.060*	0.024	0.003	0.001	0.037	0.005	*0.071*	0.047	*0.064*		
q5 Enjoyment	coef.	0.382	0.388	0.136	0.026		*0.295*	0.198	0.336	0.375	0.312	*0.257*	0.145	0.146	*0.234*	0.164	*0.299*	*0.284*	0.300	*0.255*	0.169	*0.299*	*0.238*	*0.300*	*0.227*	*0.225*	*0.284*	*0.282*	8.261	4
	l_95	0.302	0.315	0.049	-0.080		0.208	0.123	0.252	0.289	0.218	0.162	0.083	0.051	0.142	0.078	0.217	0.208	0.227	0.184	0.093	0.211	0.151	0.216	0.147	0.140	0.194	0.190		
	u_95	0.462	0.461	0.223	0.133		0.382	0.273	0.420	0.460	0.406	0.351	0.207	0.241	0.326	0.249	0.380	0.359	0.374	0.326	0.244	0.387	0.325	0.383	0.307	0.310	0.375	0.373		
	t	9.42	10.48	3.07	0.49		6.67	5.20	7.89	8.61	6.50	5.33	*4.60*	3.03	5.00	3.76	7.21	7.39	8.03	7.08	*4.39*	6.68	5.35	7.03	5.58	5.17	6.16	6.05		
	R^2	0.143	0.172	0.018	0.001		*0.078*	0.049	0.105	0.123	*0.074*	*0.051*	0.038	0.017	0.045	0.026	*0.089*	*0.094*	0.109	*0.086*	0.035	*0.084*	*0.051*	*0.085*	*0.056*	0.048	*0.067*	*0.065*		
q6 Life meaning	coef.	0.091	0.097	0.005	0.003	*0.263*		*0.262*	*0.268*	*0.234*	0.195	*0.249*	0.115	*0.210*	0.130	0.071	*0.201*	0.133	0.146	*0.225*	0.125	0.199	0.141	0.129	0.037	0.096	0.127	0.196	2.503	25
	l_95	0.010	0.023	-0.078	-0.097	0.185		0.194	0.188	0.150	0.104	0.161	0.056	0.122	0.042	-0.010	0.122	0.059	0.073	0.158	0.053	0.114	0.057	0.047	-0.041	0.014	0.039	0.108		
	u_95	0.172	0.172	0.088	0.103	0.340		0.330	0.348	0.318	0.287	0.338	0.173	0.298	0.218	0.153	0.280	0.207	0.218	0.292	0.196	0.284	0.225	0.211	0.114	0.179	0.215	0.283		
	t	2.21	2.56	0.12	0.06	6.67		7.53	6.56	5.48	*4.20*	5.53	3.83	*4.68*	2.91	1.72	5.01	3.52	3.95	6.61	3.41	*4.62*	3.31	3.09	0.93	2.29	2.84	*4.38*		
	R^2	0.009	0.012	0.000	0.000	*0.078*		*0.097*	*0.075*	*0.054*	0.032	*0.055*	0.027	0.040	0.016	0.006	0.045	0.023	0.029	*0.076*	0.022	0.042	0.020	0.018	0.002	0.010	0.015	0.035		
q7 Concentration	coef.	*0.256*	*0.206*	0.077	*0.243*	*0.245*	0.370		0.396	0.418	0.493	0.388	0.114	0.162	0.391	0.172	*0.218*	0.346	*0.281*	*0.272*	0.184	*0.272*	0.151	*0.226*	0.123	*0.239*	*0.217*	0.380	6.041	10
	l_95	0.162	0.119	-0.020	0.126	0.153	0.273		0.303	0.322	0.392	0.284	0.044	0.056	0.291	0.076	0.125	0.263	0.197	0.193	0.099	0.172	0.052	0.130	0.031	0.143	0.114	0.280		
	u_95	0.350	0.294	0.175	0.360	0.338	0.466		0.489	0.514	0.595	0.492	0.183	0.268	0.491	0.267	0.311	0.429	0.364	0.352	0.268	0.372	0.250	0.322	0.214	0.334	0.320	0.481		
	t	5.36	*4.63*	1.55	*4.09*	5.20	7.53		8.40	8.57	9.53	7.35	3.19	3.01	7.70	3.52	*4.60*	8.16	6.63	6.73	*4.27*	5.35	2.99	*4.63*	2.64	4.90	*4.13*	7.44		
	R^2	*0.052*	0.039	0.005	0.031	0.049	*0.097*		0.118	0.122	0.147	*0.093*	0.019	0.017	0.101	0.023	0.038	0.112	*0.077*	*0.079*	0.033	*0.056*	0.017	0.039	0.013	0.043	0.031	*0.095*		
q8 Security	coef.	*0.231*	*0.263*	0.074	0.172	0.312	*0.280*	*0.297*		0.422	0.395	0.322	0.122	0.131	*0.287*	0.166	0.313	0.300	*0.235*	*0.241*	0.159	0.195	0.181	0.186	0.168	*0.231*	0.188	*0.222*	5.427	16
	l_95	0.150	0.189	-0.010	0.071	0.235	0.196	0.227		0.342	0.306	0.233	0.062	0.040	0.200	0.084	0.235	0.228	0.163	0.172	0.086	0.110	0.096	0.103	0.091	0.149	0.100	0.133		
	u_95	0.311	0.336	0.158	0.273	0.390	0.364	0.366		0.502	0.483	0.411	0.181	0.222	0.374	0.248	0.390	0.372	0.307	0.309	0.232	0.281	0.265	0.269	0.246	0.314	0.277	0.311		
	t	5.63	7.03	1.73	3.34	7.89	6.56	8.40		10.32	8.79	7.08	4.00	2.82	6.47	3.96	7.92	8.20	6.39	6.93	*4.29*	*4.48*	*4.18*	*4.42*	*4.26*	5.54	*4.17*	4.91		
	R^2	*0.056*	*0.085*	0.006	0.021	0.105	*0.075*	0.118		0.167	0.127	*0.087*	0.029	0.015	*0.073*	0.029	0.105	0.113	*0.072*	*0.083*	0.034	0.040	0.032	0.035	0.033	*0.055*	0.032	0.043		
q9 Envir. healthy	coef.	*0.234*	*0.236*	0.111	*0.251*	0.328	*0.229*	*0.292*	0.396		0.438	*0.285*	0.149	0.173	*0.256*	*0.227*	*0.282*	*0.250*	*0.203*	*0.211*	*0.227*	0.194	0.155	0.387	0.199	*0.230*	*0.224*	*0.287*	6.015	11
	l_95	0.156	0.164	0.030	0.154	0.253	0.147	0.225	0.321		0.354	0.198	0.091	0.085	0.171	0.148	0.206	0.179	0.133	0.145	0.158	0.110	0.072	0.312	0.124	0.150	0.138	0.202		
	u_95	0.312	0.308	0.193	0.348	0.402	0.312	0.359	0.471		0.521	0.373	0.206	0.261	0.341	0.306	0.358	0.321	0.274	0.278	0.297	0.279	0.237	0.462	0.273	0.309	0.309	0.371		
	t	5.90	6.45	2.68	5.10	8.61	5.48	8.57	10.32		10.30	6.41	5.08	3.87	5.93	5.67	7.29	6.93	5.65	6.22	6.45	*4.53*	3.67	10.16	5.21	5.68	5.14	6.64		
	R^2	*0.062*	*0.073*	0.013	0.047	0.123	*0.054*	0.122	0.167		0.167	*0.072*	0.046	0.027	*0.062*	*0.057*	*0.091*	*0.083*	*0.057*	*0.068*	*0.073*	0.041	0.025	0.163	0.049	*0.057*	0.047	*0.077*		
q10 Energy	coef.	0.303	0.333	*0.236*	0.385	*0.237*	0.165	*0.298*	0.323	0.382		0.486	0.155	0.117	*0.266*	*0.297*	*0.253*	0.463	0.423	0.300	0.151	0.181	0.165	0.309	*0.242*	*0.278*	*0.231*	0.362	7.223	5
	l_95	0.232	0.269	0.162	0.299	0.165	0.088	0.236	0.251	0.309		0.412	0.102	0.035	0.187	0.226	0.182	0.406	0.366	0.241	0.086	0.103	0.088	0.237	0.174	0.205	0.152	0.285		
	u_95	0.373	0.397	0.309	0.472	0.309	0.243	0.359	0.395	0.455		0.560	0.208	0.199	0.345	0.369	0.324	0.519	0.481	0.359	0.217	0.259	0.242	0.381	0.310	0.350	0.311	0.438		
	t	8.44	10.29	6.28	8.76	6.50	*4.20*	9.53	8.79	10.30		12.95	5.72	2.80	6.64	8.21	6.98	16.04	14.46	10.00	*4.53*	*4.54*	*4.21*	8.47	6.95	7.50	5.73	9.31		
	R^2	0.118	0.167	*0.069*	0.126	*0.074*	0.032	0.147	0.127	0.167		0.241	*0.058*	0.015	*0.077*	0.113	*0.084*	0.328	0.284	0.159	0.037	0.041	0.032	0.120	*0.084*	*0.096*	*0.058*	0.141		

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q11 Appear-ance	coef.	0.149	0.226	0.107	0.193	0.199	0.220	0.239	0.269	0.253	0.497		0.209	0.148	0.232	0.208	0.223	0.288	0.265	0.299	0.193	0.188	0.187	0.161	0.157	0.272	0.233	0.353	5.567	13
	l_95	0.074	0.158	0.031	0.101	0.125	0.142	0.175	0.194	0.176	0.421		0.157	0.065	0.151	0.134	0.150	0.223	0.201	0.239	0.128	0.110	0.110	0.086	0.087	0.199	0.153	0.276		
	u_95	0.223	0.293	0.184	0.285	0.272	0.298	0.303	0.343	0.331	0.572		0.262	0.231	0.312	0.283	0.295	0.353	0.330	0.359	0.259	0.266	0.264	0.237	0.228	0.346	0.314	0.431		
	t	3.90	6.55	2.75	4.13	5.33	5.53	7.35	7.08	6.41	12.95		7.80	3.50	5.66	5.51	6.02	8.66	8.07	9.79	5.79	4.74	4.75	4.18	4.37	7.29	5.71	8.95		
	R^2	0.028	0.075	0.014	0.031	0.051	0.055	0.093	0.087	0.072	0.241		0.103	0.023	0.057	0.055	0.064	0.125	0.110	0.154	0.060	0.044	0.041	0.032	0.035	0.092	0.058	0.131		
q12 Money	coef.	-0.002	0.248	0.078	0.193	0.265	0.235	0.166	0.240	0.311	0.376	0.493		0.475	0.302	0.357	0.270	0.279	0.268	0.285	0.196	0.194	0.381	0.196	0.205	0.274	0.389	0.507	5.482	15
	l_95	-0.118	0.143	-0.040	0.051	0.152	0.114	0.064	0.122	0.191	0.247	0.369		0.352	0.178	0.244	0.157	0.175	0.165	0.189	0.093	0.075	0.265	0.079	0.095	0.158	0.267	0.387		
	u_95	0.114	0.354	0.197	0.336	0.378	0.355	0.268	0.357	0.432	0.506	0.618		0.597	0.427	0.470	0.383	0.384	0.370	0.382	0.298	0.313	0.498	0.313	0.314	0.390	0.511	0.627		
	t	-0.03	4.62	1.29	2.67	4.60	3.83	3.19	4.00	5.08	5.72	7.80		7.63	4.77	6.21	4.70	5.26	5.13	5.79	3.76	3.21	6.42	3.29	3.68	4.64	6.25	8.28		
	R^2	0.000	0.039	0.003	0.013	0.038	0.027	0.019	0.029	0.046	0.058	0.103		0.099	0.041	0.068	0.040	0.050	0.047	0.059	0.026	0.021	0.072	0.020	0.025	0.039	0.069	0.114		
q13 Informa-tion	coef.	-0.046	0.077	-0.024	-0.070	0.117	0.189	0.104	0.113	0.158	0.125	0.153	0.208		0.321	0.059	0.041	0.054	0.084	0.076	0.067	0.088	0.172	0.136	0.216	0.110	0.084	0.145	1.106	27
	l_95	-0.123	0.006	-0.103	-0.164	0.041	0.110	0.036	0.034	0.078	0.037	0.067	0.154		0.241	-0.018	-0.035	-0.017	0.015	0.010	-0.002	0.007	0.093	0.059	0.145	0.033	0.001	0.061		
	u_95	0.030	0.148	0.054	0.025	0.192	0.268	0.171	0.191	0.239	0.212	0.239	0.261		0.400	0.137	0.117	0.125	0.153	0.142	0.135	0.169	0.251	0.214	0.287	0.188	0.168	0.228		
	t	-1.19	2.12	-0.61	-1.44	3.03	4.68	3.01	2.82	3.87	2.80	3.50	7.63		7.92	1.51	1.06	1.50	2.38	2.28	1.91	2.14	4.30	3.46	5.99	2.79	1.98	3.40		
	R^2	0.003	0.008	0.001	0.004	0.017	0.040	0.017	0.015	0.027	0.015	0.023	0.099		0.106	0.004	0.002	0.004	0.011	0.010	0.007	0.009	0.034	0.022	0.063	0.014	0.007	0.021		
q14 Leisure	coef.	0.170	0.147	0.056	0.084	0.192	0.121	0.257	0.254	0.242	0.289	0.246	0.136	0.329		0.175	0.208	0.223	0.220	0.201	0.150	0.167	0.197	0.196	0.159	0.197	0.196	0.277	4.828	18
	l_95	0.093	0.075	-0.023	-0.012	0.117	0.039	0.192	0.177	0.162	0.203	0.161	0.080	0.248		0.098	0.133	0.154	0.152	0.136	0.082	0.085	0.117	0.119	0.086	0.119	0.113	0.195		
	u_95	0.246	0.218	0.136	0.180	0.268	0.203	0.323	0.331	0.322	0.374	0.331	0.192	0.411		0.252	0.283	0.292	0.288	0.266	0.219	0.249	0.276	0.274	0.232	0.274	0.280	0.359		
	t	4.36	4.04	1.40	1.72	5.00	2.91	7.70	6.47	5.93	6.64	5.66	4.77	7.92		4.46	5.43	6.34	6.35	6.08	4.32	4.02	4.86	4.97	4.26	4.98	4.63	6.61		
	R^2	0.035	0.030	0.004	0.006	0.045	0.016	0.101	0.073	0.062	0.077	0.057	0.041	0.106		0.036	0.053	0.071	0.071	0.065	0.034	0.032	0.043	0.045	0.033	0.045	0.039	0.076		
q15 Mobility	coef.	0.207	0.155	0.140	0.270	0.159	0.078	0.134	0.173	0.253	0.381	0.262	0.190	0.072	0.207		0.289	0.328	0.285	0.276	0.124	0.191	0.159	0.235	0.103	0.405	0.253	0.360	4.392	22
	l_95	0.124	0.078	0.054	0.168	0.076	-0.011	0.059	0.087	0.165	0.290	0.168	0.130	-0.022	0.116		0.208	0.254	0.212	0.207	0.049	0.103	0.072	0.151	0.023	0.326	0.163	0.271		
	u_95	0.290	0.233	0.225	0.372	0.242	0.167	0.209	0.259	0.340	0.473	0.355	0.250	0.167	0.298		0.370	0.401	0.358	0.345	0.199	0.279	0.247	0.319	0.184	0.484	0.343	0.448		
	t	4.89	3.92	3.19	5.20	3.76	1.72	3.52	3.96	5.67	8.21	5.51	6.21	1.51	4.46		7.04	8.79	7.67	7.83	3.23	4.25	3.58	5.48	2.52	10.04	5.51	8.02		
	R^2	0.043	0.028	0.019	0.049	0.026	0.006	0.023	0.029	0.057	0.113	0.055	0.068	0.004	0.036		0.086	0.128	0.101	0.104	0.019	0.036	0.024	0.054	0.012	0.160	0.054	0.108		
q16 Sleep	coef.	0.339	0.281	0.128	0.240	0.299	0.225	0.176	0.337	0.323	0.333	0.288	0.148	0.051	0.253	0.296		0.389	0.341	0.347	0.229	0.366	0.246	0.274	0.195	0.325	0.390	0.292	6.930	6
	l_95	0.258	0.205	0.041	0.136	0.217	0.137	0.101	0.253	0.236	0.239	0.194	0.086	-0.044	0.162	0.214		0.318	0.269	0.279	0.155	0.281	0.159	0.190	0.115	0.242	0.302	0.201		
	u_95	0.420	0.357	0.215	0.343	0.380	0.313	0.251	0.421	0.410	0.427	0.382	0.209	0.146	0.344	0.379		0.461	0.413	0.414	0.303	0.451	0.333	0.358	0.276	0.408	0.478	0.383		
	t	8.22	7.26	2.89	4.53	7.21	5.01	4.60	7.92	7.29	6.98	6.02	4.70	1.06	5.43	7.04		10.65	9.30	10.07	6.06	8.44	5.55	6.39	4.78	7.71	8.75	6.29		
	R^2	0.113	0.090	0.015	0.037	0.089	0.045	0.038	0.105	0.091	0.084	0.064	0.040	0.002	0.053	0.086		0.176	0.140	0.160	0.065	0.128	0.055	0.071	0.041	0.101	0.126	0.069		
q17 Daily activities	coef.	0.370	0.360	0.328	0.452	0.329	0.172	0.324	0.375	0.333	0.708	0.433	0.178	0.078	0.316	0.390	0.453		0.778	0.402	0.257	0.286	0.255	0.345	0.272	0.363	0.309	0.442	9.060	1
	l_95	0.283	0.279	0.238	0.345	0.242	0.076	0.246	0.285	0.238	0.621	0.335	0.111	-0.024	0.218	0.303	0.369		0.727	0.331	0.177	0.189	0.161	0.256	0.187	0.274	0.211	0.348		
	u_95	0.457	0.440	0.418	0.560	0.417	0.269	0.402	0.465	0.427	0.795	0.531	0.244	0.181	0.414	0.477	0.537		0.829	0.474	0.337	0.382	0.349	0.435	0.358	0.452	0.407	0.537		
	t	8.36	8.78	7.16	8.26	7.39	3.52	8.16	8.20	6.93	16.04	8.66	5.26	1.50	6.34	8.79	10.65		29.91	10.99	6.31	5.80	5.33	7.56	6.25	7.99	6.22	9.18		
	R^2	0.117	0.127	0.088	0.114	0.094	0.023	0.112	0.113	0.083	0.328	0.125	0.050	0.004	0.071	0.128	0.176		0.629	0.186	0.070	0.065	0.051	0.098	0.069	0.108	0.068	0.137		
q18 Work capacity	coef.	0.341	0.361	0.315	0.457	0.362	0.198	0.274	0.304	0.280	0.670	0.415	0.177	0.126	0.322	0.352	0.412	0.808		0.436	0.242	0.264	0.244	0.362	0.258	0.334	0.313	0.381	8.685	2
	l_95	0.251	0.279	0.222	0.348	0.273	0.099	0.193	0.211	0.183	0.579	0.314	0.109	0.022	0.222	0.262	0.325	0.755		0.364	0.160	0.165	0.148	0.272	0.171	0.242	0.214	0.282		
	u_95	0.430	0.443	0.407	0.567	0.450	0.296	0.355	0.398	0.377	0.761	0.516	0.244	0.230	0.421	0.443	0.499	0.861		0.509	0.324	0.362	0.340	0.453	0.346	0.426	0.413	0.480		
	t	7.47	8.63	6.70	8.20	8.03	3.95	6.63	6.39	5.65	14.46	8.07	5.13	2.38	6.35	7.67	9.30	29.91		11.87	5.81	5.24	4.97	7.84	5.80	7.16	6.18	7.59		
	R^2	0.095	0.123	0.078	0.113	0.109	0.029	0.077	0.072	0.057	0.284	0.110	0.047	0.011	0.071	0.101	0.140	0.629		0.211	0.060	0.054	0.045	0.104	0.060	0.088	0.067	0.098		
q19 Self satisfac-tion	coef.	0.213	0.305	0.128	0.352	0.339	0.338	0.290	0.345	0.322	0.529	0.513	0.208	0.127	0.324	0.377	0.462	0.462	0.482		0.311	0.395	0.300	0.309	0.250	0.336	0.359	0.387	8.508	3
	l_95	0.116	0.216	0.027	0.234	0.245	0.238	0.205	0.247	0.220	0.425	0.410	0.138	0.017	0.219	0.282	0.372	0.379	0.402		0.226	0.293	0.200	0.212	0.158	0.239	0.255	0.283		
	u_95	0.311	0.393	0.229	0.471	0.433	0.439	0.374	0.443	0.424	0.633	0.616	0.279	0.236	0.429	0.471	0.553	0.544	0.562		0.395	0.496	0.400	0.407	0.342	0.433	0.463	0.491		
	t	4.30	6.77	2.50	5.83	7.08	6.61	6.73	6.93	6.22	10.00	9.79	5.79	2.28	6.08	7.83	10.07	10.99	11.87		7.22	7.65	5.87	6.23	5.33	6.80	6.78	7.30		
	R^2	0.034	0.079	0.012	0.060	0.086	0.076	0.079	0.083	0.068	0.159	0.154	0.059	0.010	0.065	0.104	0.160	0.186	0.211		0.090	0.108	0.061	0.068	0.051	0.080	0.080	0.091		
q20 Relation-ships	coef.	0.174	0.189	0.059	0.214	0.208	0.173	0.182	0.211	0.320	0.247	0.309	0.132	0.103	0.226	0.157	0.282	0.273	0.247	0.288		0.193	0.363	0.290	0.199	0.267	0.232	0.225	4.559	20
	l_95	0.080	0.102	-0.039	0.098	0.115	0.074	0.098	0.115	0.223	0.140	0.204	0.063	-0.003	0.123	0.062	0.191	0.188	0.164	0.210		0.094	0.269	0.197	0.110	0.172	0.130	0.122		
	u_95	0.269	0.276	0.156	0.330	0.301	0.273	0.265	0.308	0.418	0.354	0.413	0.201	0.208	0.329	0.252	0.374	0.357	0.331	0.366		0.293	0.458	0.384	0.289	0.361	0.335	0.329		
	t	3.63	4.26	1.19	3.62	4.39	3.41	4.27	4.29	6.45	4.53	5.79	3.76	1.91	4.32	3.23	6.06	6.31	5.81	7.22		3.82	7.54	6.08	4.38	5.54	4.47	4.29		
	R^2	0.024	0.033	0.003	0.024	0.035	0.022	0.033	0.034	0.073	0.037	0.060	0.026	0.007	0.034	0.019	0.065	0.070	0.060	0.090		0.029	0.097	0.065	0.035	0.055	0.036	0.034		

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q21 Sex life	coef.	*0.203*	0.173	0.084	0.062	*0.281*	*0.211*	*0.205*	*0.202*	*0.209*	*0.225*	*0.235*	0.107	0.105	0.192	0.188	**0.349**	*0.227*	*0.203*	*0.272*	0.151		**0.345**	**0.337**	*0.208*	*0.233*	**0.374**	*0.272*	5.146	17
	l_95	0.115	0.092	-0.003	-0.046	0.199	0.122	0.130	0.114	0.118	0.128	0.138	0.041	0.008	0.098	0.101	0.268	0.150	0.127	0.202	0.073		0.259	0.254	0.126	0.146	0.284	0.179		
	u_95	0.290	0.254	0.171	0.170	0.364	0.301	0.280	0.291	0.299	0.323	0.333	0.172	0.202	0.286	0.275	0.430	0.303	0.279	0.342	0.228		0.430	0.420	0.290	0.320	0.464	0.366		
	t	*4.57*	*4.21*	1.91	1.13	**6.68**	*4.62*	**5.35**	*4.48*	*4.53*	*4.54*	*4.74*	3.21	2.14	*4.02*	*4.25*	**8.44**	**5.80**	**5.24**	**7.65**	3.82		**7.88**	**8.01**	**4.98**	**5.27**	**8.17**	**5.71**		
	R^2	0.041	0.035	0.007	0.003	*0.084*	0.042	*0.056*	0.040	0.041	0.041	0.044	0.021	0.009	0.032	0.036	**0.128**	*0.065*	*0.054*	**0.108**	0.029		**0.113**	**0.117**	0.049	*0.054*	**0.120**	*0.063*		
q22 Support	coef.	0.163	*0.201*	0.009	0.031	*0.215*	0.143	0.110	0.176	0.160	0.196	*0.219*	0.188	0.195	*0.216*	0.149	*0.223*	0.199	0.183	*0.203*	*0.266*	**0.328**		**0.305**	*0.262*	*0.282*	**0.342**	*0.241*	4.442	21
	l_95	0.083	0.128	-0.074	-0.069	0.136	0.058	0.038	0.093	0.074	0.105	0.129	0.131	0.106	0.129	0.067	0.144	0.126	0.111	0.135	0.197	0.246		0.226	0.188	0.202	0.257	0.154		
	u_95	0.244	0.275	0.092	0.132	0.294	0.228	0.182	0.259	0.246	0.288	0.310	0.246	0.284	0.304	0.230	0.301	0.272	0.255	0.271	0.336	0.410		0.384	0.337	0.362	0.426	0.328		
	t	3.98	**5.36**	0.21	0.61	**5.35**	3.31	2.99	*4.18*	3.67	*4.21*	*4.75*	**6.42**	*4.30*	*4.86*	3.58	**5.55**	**5.33**	**4.97**	**5.87**	**7.54**	**7.88**		**7.59**	**6.91**	**6.96**	**7.97**	**5.42**		
	R^2	0.029	*0.051*	0.000	0.001	*0.051*	0.020	0.017	0.032	0.025	0.032	0.041	*0.072*	0.034	0.043	0.024	*0.055*	*0.051*	0.045	*0.061*	*0.097*	**0.113**		*0.098*	*0.083*	*0.084*	**0.107**	*0.052*		
q23 Living conditions	coef.	*0.261*	*0.287*	0.088	*0.231*	*0.285*	0.137	0.172	0.190	**0.421**	**0.387**	0.199	0.102	0.162	*0.227*	*0.229*	*0.261*	*0.282*	*0.287*	*0.221*	*0.224*	**0.346**	**0.321**		*0.271*	**0.304**	*0.293*	**0.360**	6.059	9
	l_95	0.180	0.214	0.003	0.130	0.205	0.050	0.099	0.106	0.340	0.297	0.105	0.041	0.070	0.137	0.147	0.180	0.209	0.215	0.151	0.152	0.261	0.238		0.195	0.222	0.205	0.274		
	u_95	0.341	0.361	0.174	0.332	0.364	0.225	0.245	0.275	0.502	0.476	0.292	0.163	0.254	0.316	0.311	0.341	0.356	0.359	0.290	0.297	0.431	0.404		0.348	0.385	0.380	0.447		
	t	**6.34**	**7.66**	2.04	*4.49*	**7.03**	3.09	*4.63*	*4.42*	**10.16**	**8.47**	*4.18*	3.29	3.46	**4.97**	**5.48**	**6.39**	**7.56**	**7.84**	**6.23**	**6.08**	**8.01**	**7.59**		**6.98**	**7.34**	**6.56**	**8.16**		
	R^2	*0.070*	*0.099*	0.008	0.037	*0.085*	0.018	0.039	0.035	**0.163**	**0.120**	0.032	0.020	0.022	0.045	*0.054*	*0.071*	*0.098*	**0.104**	*0.068*	*0.065*	**0.117**	*0.098*		*0.084*	*0.092*	*0.075*	**0.112**		
q24 Health serv.	coef.	0.170	0.190	0.081	0.093	*0.245*	0.045	0.106	0.196	*0.246*	**0.346**	*0.221*	0.121	*0.293*	*0.208*	0.115	*0.211*	*0.253*	*0.231*	*0.204*	0.175	*0.234*	**0.314**	**0.310**		*0.288*	*0.210*	0.124	4.375	23
	l_95	0.082	0.109	-0.010	-0.017	0.158	-0.049	0.027	0.106	0.153	0.249	0.122	0.057	0.197	0.112	0.025	0.124	0.173	0.153	0.128	0.096	0.142	0.225	0.223		0.200	0.114	0.026		
	u_95	0.258	0.272	0.172	0.203	0.331	0.139	0.185	0.287	0.338	0.444	0.321	0.186	0.389	0.304	0.204	0.298	0.332	0.310	0.279	0.253	0.326	0.404	0.398		0.375	0.306	0.222		
	t	3.79	*4.58*	1.74	1.67	**5.58**	0.93	2.64	*4.26*	**5.21**	**6.95**	*4.37*	3.68	**5.99**	*4.26*	2.52	*4.78*	**6.25**	**5.80**	**5.33**	*4.38*	**4.98**	**6.91**	**6.98**		**6.44**	*4.30*	2.49		
	R^2	0.026	0.038	0.006	0.005	*0.056*	0.002	0.013	0.033	0.049	*0.084*	0.035	0.025	*0.063*	0.033	0.012	0.041	*0.069*	*0.060*	*0.051*	0.035	0.049	*0.083*	*0.084*		*0.073*	0.034	0.012		
q25 Transport	coef.	*0.232*	0.195	0.144	**0.322**	*0.213*	0.102	0.182	*0.236*	*0.250*	**0.346**	**0.336**	0.142	0.131	*0.227*	**0.396**	**0.309**	*0.296*	*0.264*	*0.239*	*0.205*	*0.232*	*0.296*	**0.304**	*0.252*		*0.282*	**0.314**	6.070	8
	l_95	0.151	0.119	0.059	0.222	0.132	0.014	0.109	0.152	0.164	0.256	0.245	0.082	0.039	0.137	0.318	0.230	0.223	0.191	0.170	0.133	0.145	0.213	0.222	0.175		0.194	0.226		
	u_95	0.313	0.271	0.228	0.421	0.295	0.190	0.255	0.320	0.336	0.437	0.426	0.203	0.223	0.316	0.473	0.388	0.369	0.336	0.308	0.278	0.318	0.380	0.385	0.329		0.370	0.402		
	t	**5.62**	**5.04**	3.35	**6.36**	**5.17**	2.29	**4.90**	**5.54**	**5.68**	**7.50**	**7.29**	*4.64*	2.79	**4.98**	**10.04**	**7.71**	**7.99**	**7.16**	**6.80**	**5.54**	**5.27**	**6.96**	**7.34**	**6.44**		**6.29**	**7.01**		
	R^2	*0.056*	0.046	0.021	*0.071*	0.048	0.010	0.043	*0.055*	*0.057*	*0.096*	*0.092*	0.039	0.014	0.045	**0.160**	**0.101**	**0.108**	*0.088*	*0.080*	*0.055*	*0.054*	*0.084*	*0.092*	*0.073*		*0.069*	*0.085*		
q26 Depress-ion	coef.	0.199	*0.258*	0.197	*0.245*	*0.235*	0.118	0.144	0.168	*0.212*	*0.252*	*0.249*	0.176	0.087	0.197	*0.214*	**0.322**	*0.220*	*0.215*	*0.222*	0.156	**0.322**	**0.312**	*0.256*	0.160	*0.246*		**0.341**	5.517	14
	l_95	0.123	0.189	0.119	0.151	0.160	0.036	0.075	0.089	0.131	0.166	0.163	0.121	0.001	0.114	0.138	0.250	0.150	0.146	0.158	0.087	0.244	0.235	0.179	0.087	0.169		0.260		
	u_95	0.275	0.327	0.275	0.339	0.309	0.199	0.212	0.247	0.292	0.338	0.334	0.231	0.173	0.281	0.291	0.395	0.289	0.283	0.286	0.224	0.399	0.389	0.333	0.233	0.322		0.422		
	t	**5.12**	**7.34**	**4.97**	**5.13**	**6.16**	2.84	*4.13*	*4.17*	**5.14**	**5.73**	**5.71**	**6.25**	1.98	*4.63*	**5.51**	**8.75**	**6.22**	**6.18**	**6.78**	*4.47*	**8.17**	**7.97**	**6.56**	*4.30*	**6.29**		**8.30**		
	R^2	0.047	*0.092*	0.044	0.047	*0.067*	0.015	0.031	0.032	0.047	*0.058*	*0.058*	*0.069*	0.007	0.039	*0.054*	**0.126**	*0.068*	*0.067*	*0.080*	0.036	**0.120**	**0.107**	*0.075*	0.034	*0.069*		**0.115**		
q27 Food enough	coef.	*0.218*	0.189	0.119	*0.283*	*0.229*	0.179	*0.248*	0.195	*0.268*	**0.389**	**0.372**	*0.225*	0.147	*0.274*	**0.301**	*0.237*	**0.310**	*0.257*	*0.236*	0.149	*0.230*	*0.217*	**0.309**	0.093	*0.270*	**0.336**		5.923	12
	l_95	0.143	0.119	0.041	0.191	0.155	0.099	0.183	0.117	0.188	0.307	0.291	0.172	0.062	0.193	0.228	0.163	0.244	0.191	0.172	0.081	0.151	0.138	0.235	0.020	0.194	0.256			
	u_95	0.293	0.259	0.198	0.376	0.304	0.259	0.314	0.273	0.347	0.471	0.454	0.279	0.232	0.356	0.375	0.311	0.376	0.324	0.299	0.217	0.309	0.296	0.384	0.167	0.346	0.415			
	t	**5.69**	**5.30**	2.98	**6.03**	**6.05**	*4.38*	**7.44**	**4.91**	**6.64**	**9.31**	**8.95**	**8.28**	3.40	**6.61**	**8.02**	**6.29**	**9.18**	**7.59**	**7.30**	*4.29*	**5.71**	**5.42**	**8.16**	2.49	**7.01**	**8.30**			
	R^2	*0.057*	*0.050*	0.016	*0.064*	*0.065*	0.035	*0.095*	0.043	*0.077*	**0.141**	**0.131**	**0.114**	0.021	*0.076*	**0.108**	*0.069*	**0.137**	*0.098*	*0.091*	0.034	*0.063*	*0.052*	**0.112**	0.012	*0.085*	**0.115**			
Total R^2		1.394	1.742	0.646	1.069	1.698	0.807	1.466	1.595	1.866	2.712	1.820	1.117	0.571	1.220	1.342	1.945	2.602	2.929	2.103	1.038	1.376	1.270	1.726	1.007	1.652	1.536	1.862		

coef. = univariate linear regression coefficient; l_95 = lower 95% confidence interval; u_95 = upper 95% confidence interval; t = t statistic

satistical significance:
- **5.76** = associations equivalent to p<0.00001 significant
- **4.87** = associations equivalent to p<0.001 significant
- *4.00* = associations equivalent to p<0.05 significant

all after adjusting for 27*26=702 comparisons (Bonferroni correction)

- **0.400** > 0.4 correlation
- **0.300** 0.4 > 0.3 correlation
- *0.200* 0.3 > 0.2 correlation

- **0.150** > 0.150 R^2
- **0.100** 0.150 > 0.100 R^2
- *0.050* 0.100 > 0.050 R^2

Table N.2 Univariate regressions of each WHOQoL-BREF quality of life facet against each other (pilot study, n=309)

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q1 overall QoL	coef.		0.411	0.248	0.232	0.405	0.326	0.264	0.432	0.473	0.156	0.271	0.566	0.510	0.509	0.412	0.426	0.159	0.169	0.409	0.288	0.245	0.253	0.388	0.317	0.355	0.404	0.456	8.600	5
	l_95		0.311	0.126	0.094	0.332	0.242	0.151	0.331	0.374	0.030	0.183	0.473	0.410	0.396	0.295	0.329	0.026	0.035	0.329	0.199	0.096	0.159	0.273	0.226	0.256	0.311	0.373		
	u_95		0.512	0.370	0.370	0.478	0.410	0.377	0.532	0.572	0.282	0.359	0.659	0.611	0.622	0.529	0.522	0.292	0.303	0.488	0.377	0.395	0.347	0.503	0.408	0.453	0.497	0.540		
	t		8.07	3.99	3.32	10.89	7.62	4.58	8.43	9.39	2.44	6.05	11.97	9.98	8.86	6.94	8.69	2.36	2.47	10.12	6.34	3.23	5.31	6.64	6.87	7.09	8.54	10.73		
	R^2		0.175	0.049	0.035	0.279	0.160	0.064	0.188	0.223	0.019	0.108	0.318	0.245	0.204	0.138	0.198	0.018	0.020	0.251	0.116	0.051	0.084	0.126	0.133	0.141	0.192	0.273		
q2 Health	coef.	0.425		0.432	0.292	0.237	0.129	0.109	0.089	0.164	0.394	0.108	0.166	0.258	0.297	0.300	0.306	0.115	0.160	0.187	0.120	0.317	0.108	0.167	0.143	0.115	0.239	0.169	3.685	24
	l_95	0.322		0.314	0.154	0.153	0.037	-0.009	-0.024	0.051	0.273	0.014	0.053	0.144	0.173	0.178	0.202	-0.021	0.024	0.096	0.024	0.171	0.009	0.044	0.045	0.008	0.137	0.071		
	u_95	0.529		0.550	0.431	0.320	0.222	0.226	0.202	0.277	0.515	0.203	0.279	0.373	0.422	0.423	0.410	0.250	0.297	0.278	0.216	0.462	0.207	0.291	0.241	0.223	0.341	0.267		
	t	8.07		7.22	4.15	5.58	2.77	1.82	1.55	2.86	6.40	2.25	2.89	4.45	4.70	4.82	5.80	1.66	2.31	4.06	2.47	4.29	2.15	2.66	2.87	2.12	4.62	3.39		
	R^2	0.175		0.145	0.053	0.092	0.025	0.011	0.008	0.026	0.118	0.017	0.027	0.061	0.067	0.072	0.099	0.009	0.017	0.051	0.019	0.086	0.015	0.023	0.026	0.014	0.065	0.036		
q3 Pain	coef.	0.199	0.336		0.696	0.098	0.040	0.100	0.142	0.061	0.363	0.110	0.118	0.155	0.223	0.390	0.234	0.348	0.351	0.124	0.044	0.198	0.007	0.068	0.057	0.070	0.148	0.103	2.718	26
	l_95	0.101	0.244		0.598	0.021	-0.043	-0.003	0.043	-0.039	0.257	0.027	0.018	0.053	0.112	0.286	0.141	0.235	0.236	0.043	-0.041	0.064	-0.081	-0.042	-0.030	-0.025	0.056	0.016		
	u_95	0.297	0.427		0.794	0.174	0.122	0.203	0.241	0.162	0.469	0.193	0.218	0.258	0.334	0.494	0.327	0.462	0.466	0.205	0.129	0.331	0.095	0.178	0.144	0.165	0.239	0.191		
	t	3.99	7.22		13.95	2.52	0.95	1.91	2.81	1.20	6.73	2.60	2.32	2.99	3.96	7.36	4.96	6.04	6.01	3.00	1.02	2.92	0.17	1.22	1.28	1.45	3.18	2.33		
	R^2	0.049	0.145		0.388	0.020	0.003	0.012	0.025	0.005	0.129	0.022	0.017	0.028	0.049	0.152	0.074	0.106	0.105	0.029	0.003	0.042	0.000	0.005	0.005	0.007	0.032	0.017		
q4 Medicine	coef.	0.149	0.182	0.557		0.052	0.083	0.065	0.181	0.110	0.248	0.181	0.278	0.137	0.189	0.377	0.254	0.341	0.298	0.170	0.043	0.194	0.008	-0.018	0.025	0.151	0.198	0.141	3.264	25
	l_95	0.061	0.096	0.479		-0.017	0.009	-0.027	0.094	0.021	0.150	0.108	0.193	0.046	0.090	0.286	0.172	0.240	0.194	0.099	-0.033	0.071	-0.071	-0.116	-0.054	0.068	0.118	0.064		
	u_95	0.238	0.268	0.636		0.120	0.156	0.158	0.269	0.200	0.346	0.253	0.362	0.229	0.288	0.469	0.335	0.441	0.401	0.241	0.119	0.317	0.087	0.081	0.103	0.235	0.278	0.218		
	t	3.32	4.15	13.95		1.47	2.22	1.39	4.09	2.43	4.98	4.92	6.44	2.95	3.74	8.13	6.13	6.68	5.67	4.71	1.11	3.10	0.20	-0.36	0.62	3.57	4.86	3.61		
	R^2	0.035	0.053	0.388		0.007	0.016	0.006	0.052	0.019	0.075	0.074	0.119	0.028	0.044	0.180	0.109	0.127	0.095	0.068	0.004	0.047	0.000	0.000	0.001	0.040	0.071	0.041		
q5 Enjoyment	coef.	0.688	0.389	0.207	0.136		0.544	0.450	0.485	0.552	0.190	0.417	0.616	0.519	0.564	0.435	0.535	0.341	0.341	0.512	0.424	0.496	0.245	0.379	0.253	0.391	0.477	0.474	9.348	3
	l_95	0.564	0.252	0.045	-0.046		0.440	0.307	0.350	0.419	0.026	0.304	0.487	0.379	0.411	0.279	0.408	0.171	0.168	0.407	0.309	0.301	0.120	0.224	0.129	0.259	0.353	0.358		
	u_95	0.813	0.526	0.369	0.318		0.648	0.594	0.621	0.685	0.354	0.530	0.746	0.658	0.716	0.592	0.662	0.512	0.514	0.617	0.538	0.691	0.370	0.533	0.377	0.522	0.601	0.591		
	t	10.89	5.58	2.52	1.47		10.29	6.17	7.06	8.18	2.28	7.27	9.35	7.32	7.26	5.47	8.31	3.94	3.89	9.57	7.28	5.01	3.86	4.82	4.01	5.85	7.56	8.02		
	R^2	0.279	0.092	0.020	0.007		0.259	0.111	0.140	0.179	0.017	0.150	0.222	0.149	0.147	0.090	0.184	0.048	0.047	0.231	0.147	0.114	0.046	0.070	0.050	0.100	0.157	0.173		
q6 Life meaning	coef.	0.492	0.190	0.074	0.193	0.475		0.457	0.309	0.472	0.153	0.529	0.487	0.397	0.354	0.282	0.387	0.192	0.127	0.477	0.284	0.387	0.197	0.185	0.142	0.164	0.356	0.446	6.309	15
	l_95	0.365	0.055	-0.080	0.022	0.384		0.322	0.175	0.344	-0.002	0.432	0.359	0.262	0.203	0.129	0.262	0.029	-0.039	0.378	0.172	0.205	0.079	0.036	0.023	0.035	0.236	0.336		
	u_95	0.619	0.324	0.229	0.364	0.566		0.591	0.442	0.601	0.309	0.627	0.614	0.533	0.504	0.435	0.512	0.356	0.293	0.575	0.395	0.569	0.316	0.334	0.262	0.293	0.477	0.555		
	t	7.62	2.77	0.95	2.22	10.29		6.66	4.55	7.24	1.94	10.72	7.50	5.76	4.62	3.64	6.09	2.31	1.50	9.54	4.99	4.21	3.27	2.44	2.34	2.51	5.80	8.02		
	R^2	0.160	0.025	0.003	0.016	0.259		0.128	0.064	0.147	0.012	0.278	0.156	0.099	0.066	0.042	0.109	0.017	0.007	0.231	0.076	0.084	0.034	0.019	0.018	0.020	0.100	0.175		
q7 Concentration	coef.	0.243	0.099	0.117	0.096	0.246	0.280		0.451	0.316	0.294	0.257	0.165	0.289	0.353	0.243	0.306	0.259	0.292	0.210	0.270	0.337	0.142	0.267	0.251	0.297	0.266	0.182	5.729	17
	l_95	0.139	-0.008	-0.004	-0.040	0.168	0.197		0.355	0.212	0.176	0.171	0.057	0.181	0.237	0.124	0.208	0.132	0.164	0.124	0.184	0.195	0.048	0.151	0.161	0.200	0.171	0.090		
	u_95	0.348	0.206	0.239	0.232	0.324	0.362		0.547	0.419	0.413	0.343	0.272	0.397	0.469	0.362	0.405	0.386	0.420	0.296	0.356	0.479	0.235	0.383	0.341	0.395	0.362	0.275		
	t	4.58	1.82	1.91	1.39	6.17	6.66		9.23	6.02	4.88	5.88	3.00	5.27	5.99	4.02	6.10	4.02	4.50	4.80	6.14	4.67	2.98	4.54	5.47	6.00	5.49	3.87		
	R^2	0.064	0.011	0.012	0.006	0.111	0.128		0.218	0.106	0.072	0.103	0.029	0.083	0.105	0.051	0.108	0.050	0.062	0.070	0.110	0.101	0.028	0.063	0.089	0.105	0.090	0.047		
q8 Security	coef.	0.436	0.087	0.178	0.284	0.288	0.207	0.483		0.456	0.247	0.231	0.422	0.389	0.386	0.378	0.393	0.401	0.330	0.327	0.273	0.233	0.186	0.316	0.253	0.377	0.301	0.342	7.274	12
	l_95	0.334	-0.024	0.053	0.147	0.208	0.117	0.380		0.356	0.122	0.140	0.319	0.281	0.266	0.260	0.295	0.274	0.199	0.243	0.183	0.080	0.089	0.197	0.159	0.279	0.203	0.251		
	u_95	0.537	0.197	0.302	0.421	0.368	0.296	0.586		0.557	0.371	0.321	0.525	0.497	0.506	0.496	0.492	0.528	0.461	0.412	0.364	0.385	0.282	0.434	0.347	0.475	0.400	0.433		
	t	8.43	1.55	2.81	4.09	7.06	4.55	9.23		8.93	3.90	5.00	8.08	7.10	6.34	6.29	7.85	6.23	4.96	7.62	5.94	3.02	3.80	5.25	5.31	7.58	6.02	7.41		
	R^2	0.188	0.008	0.025	0.052	0.140	0.064	0.218		0.206	0.047	0.077	0.176	0.141	0.116	0.116	0.167	0.112	0.074	0.159	0.103	0.044	0.045	0.082	0.084	0.158	0.106	0.152		
q9 Envir. healthy	coef.	0.472	0.158	0.076	0.171	0.324	0.311	0.336	0.451		0.047	0.274	0.511	0.438	0.395	0.241	0.328	0.123	0.057	0.319	0.247	0.243	0.194	0.346	0.197	0.265	0.349	0.399	5.963	16
	l_95	0.373	0.049	-0.049	0.033	0.246	0.227	0.226	0.352		-0.080	0.186	0.415	0.333	0.276	0.116	0.227	-0.010	-0.078	0.234	0.156	0.094	0.098	0.230	0.102	0.164	0.254	0.312		
	u_95	0.571	0.267	0.201	0.310	0.402	0.396	0.445	0.551		0.174	0.362	0.608	0.543	0.514	0.366	0.429	0.256	0.193	0.403	0.338	0.392	0.289	0.463	0.292	0.367	0.445	0.486		
	t	9.39	2.86	1.20	2.43	8.18	7.24	6.02	8.93		0.73	6.13	10.40	8.24	6.53	3.79	6.39	1.82	0.83	7.43	5.36	3.21	3.98	5.85	4.09	5.13	7.17	9.00		
	R^2	0.223	0.026	0.005	0.019	0.179	0.147	0.106	0.206		0.002	0.111	0.260	0.181	0.122	0.045	0.117	0.011	0.002	0.153	0.086	0.050	0.049	0.100	0.052	0.079	0.144	0.209		
q10 Energy	coef.	0.122	0.299	0.354	0.302	0.088	0.080	0.245	0.192	0.037		0.264	0.023	0.198	0.196	0.356	0.163	0.365	0.493	0.155	0.018	0.266	-0.030	0.039	0.089	0.151	0.063	0.079	2.677	27
	l_95	0.024	0.207	0.250	0.183	0.012	-0.001	0.146	0.095	-0.063		0.187	-0.077	0.098	0.086	0.252	0.070	0.253	0.387	0.075	-0.067	0.130	-0.116	-0.070	0.003	0.059	-0.028	-0.008		
	u_95	0.221	0.390	0.458	0.421	0.163	0.161	0.344	0.288	0.136		0.341	0.123	0.299	0.306	0.460	0.257	0.476	0.600	0.234	0.102	0.401	0.057	0.148	0.174	0.244	0.155	0.165		
	t	2.44	6.40	6.73	4.98	2.28	1.94	4.88	3.90	0.73		6.74	0.45	3.90	3.51	6.72	3.43	6.45	9.12	3.84	0.41	3.87	-0.67	0.70	2.03	3.22	1.36	1.79		
	R^2	0.019	0.118	0.129	0.075	0.017	0.012	0.072	0.047	0.002		0.131	0.001	0.047	0.039	0.130	0.037	0.119	0.213	0.046	0.001	0.071	0.002	0.002	0.013	0.033	0.006	0.010		

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q11 Appearance	coef.	0.400	0.153	0.200	0.412	0.358	0.526	0.402	0.333	0.405	0.496		0.484	0.431	0.398	0.444	0.383	0.295	0.315	0.546	0.309	0.402	0.137	0.205	0.099	0.279	0.290	0.470	7.771	10
	l_95	0.270	0.019	0.048	0.247	0.261	0.429	0.268	0.202	0.275	0.351		0.358	0.299	0.250	0.300	0.258	0.134	0.152	0.453	0.198	0.229	0.017	0.057	-0.021	0.153	0.168	0.362		
	u_95	0.531	0.287	0.351	0.577	0.455	0.622	0.536	0.463	0.535	0.641		0.610	0.563	0.547	0.589	0.509	0.455	0.477	0.640	0.421	0.574	0.256	0.352	0.218	0.405	0.412	0.579		
	t	6.05	2.25	2.60	4.92	7.27	10.72	5.88	5.00	6.13	6.74		7.55	6.42	5.27	6.06	6.03	3.61	3.82	11.50	5.49	4.58	2.25	2.73	1.63	4.35	4.67	8.55		
	R^2	0.108	0.017	0.022	0.074	0.150	0.278	0.103	0.077	0.111	0.131		0.159	0.120	0.085	0.110	0.108	0.041	0.046	0.306	0.091	0.098	0.017	0.024	0.009	0.059	0.068	0.196		
q12 Money	coef.	0.562	0.160	0.146	0.429	0.360	0.321	0.174	0.416	0.509	0.029	0.329		0.558	0.484	0.408	0.403	0.222	0.152	0.382	0.235	0.330	0.217	0.323	0.186	0.373	0.375	0.539	7.552	11
	l_95	0.470	0.051	0.022	0.298	0.284	0.237	0.060	0.314	0.413	-0.097	0.243		0.461	0.370	0.293	0.306	0.091	0.018	0.301	0.144	0.188	0.122	0.206	0.091	0.276	0.280	0.462		
	u_95	0.654	0.268	0.270	0.560	0.436	0.405	0.288	0.517	0.606	0.155	0.414		0.655	0.598	0.524	0.500	0.353	0.286	0.462	0.326	0.473	0.312	0.440	0.281	0.471	0.469	0.615		
	t	11.97	2.89	2.32	6.44	9.35	7.50	3.00	8.08	10.40	0.45	7.55		11.33	8.34	6.95	8.16	3.33	2.23	9.31	5.09	4.57	4.51	5.43	3.86	7.56	7.81	13.79		
	R^2	0.318	0.027	0.017	0.119	0.222	0.156	0.029	0.176	0.260	0.001	0.159		0.295	0.185	0.138	0.178	0.035	0.016	0.221	0.078	0.096	0.062	0.088	0.046	0.157	0.166	0.383		
q13 Information	coef.	0.480	0.235	0.182	0.201	0.287	0.248	0.288	0.362	0.413	0.238	0.279	0.528		0.645	0.545	0.406	0.320	0.295	0.361	0.252	0.268	0.259	0.341	0.305	0.362	0.334	0.369	7.913	7
	l_95	0.385	0.131	0.062	0.067	0.210	0.163	0.180	0.262	0.314	0.118	0.193	0.437		0.546	0.439	0.312	0.196	0.168	0.282	0.165	0.125	0.168	0.228	0.217	0.267	0.241	0.283		
	u_95	0.574	0.339	0.302	0.334	0.364	0.333	0.395	0.463	0.512	0.358	0.365	0.620		0.744	0.651	0.499	0.445	0.423	0.440	0.340	0.412	0.349	0.454	0.393	0.456	0.427	0.454		
	t	9.98	4.45	2.99	2.95	7.32	5.76	5.27	7.10	8.24	3.90	6.42	11.33		12.81	10.14	8.50	5.05	4.57	8.99	5.66	3.70	5.61	5.94	6.80	7.53	7.05	8.47		
	R^2	0.245	0.061	0.028	0.028	0.149	0.099	0.083	0.141	0.181	0.047	0.120	0.295		0.349	0.254	0.191	0.077	0.064	0.209	0.095	0.065	0.093	0.103	0.131	0.156	0.139	0.189		
q14 Leisure	coef.	0.401	0.227	0.218	0.231	0.260	0.186	0.298	0.301	0.310	0.197	0.213	0.383	0.541		0.567	0.405	0.279	0.286	0.252	0.252	0.267	0.247	0.293	0.255	0.321	0.424	0.403	7.103	14
	l_95	0.312	0.132	0.109	0.110	0.190	0.107	0.200	0.207	0.216	0.087	0.133	0.292	0.458		0.475	0.321	0.164	0.170	0.176	0.172	0.129	0.165	0.189	0.173	0.234	0.346	0.330		
	u_95	0.490	0.321	0.326	0.353	0.331	0.265	0.396	0.394	0.403	0.308	0.292	0.473	0.624		0.658	0.489	0.393	0.402	0.328	0.331	0.404	0.330	0.396	0.337	0.408	0.503	0.477		
	t	8.86	4.70	3.96	3.74	7.26	4.62	5.99	6.34	6.53	3.51	5.27	8.34	12.81		12.17	9.49	4.79	4.86	6.49	6.22	3.82	5.88	5.57	6.12	7.26	10.59	10.75		
	R^2	0.204	0.067	0.049	0.044	0.147	0.066	0.105	0.116	0.122	0.039	0.085	0.185	0.349		0.330	0.228	0.070	0.072	0.121	0.112	0.070	0.102	0.092	0.109	0.147	0.268	0.274		
q15 Mobility	coef.	0.334	0.238	0.390	0.476	0.207	0.150	0.209	0.306	0.189	0.366	0.248	0.338	0.466	0.582		0.501	0.431	0.483	0.314	0.180	0.357	0.189	0.207	0.234	0.344	0.323	0.325	7.842	8
	l_95	0.239	0.141	0.286	0.361	0.133	0.069	0.107	0.210	0.091	0.259	0.167	0.242	0.376	0.488		0.420	0.319	0.373	0.239	0.096	0.215	0.102	0.097	0.149	0.255	0.236	0.244		
	u_95	0.429	0.335	0.494	0.591	0.282	0.232	0.312	0.402	0.287	0.473	0.329	0.434	0.557	0.676		0.581	0.543	0.594	0.390	0.264	0.498	0.276	0.316	0.319	0.432	0.410	0.407		
	t	6.94	4.82	7.36	8.13	5.47	3.64	4.02	6.29	3.79	6.72	6.06	6.95	10.14	12.17		12.24	7.58	8.61	8.18	4.20	4.97	4.29	3.71	5.40	7.66	7.32	7.83		
	R^2	0.138	0.072	0.152	0.180	0.090	0.042	0.051	0.116	0.045	0.130	0.110	0.138	0.254	0.330		0.332	0.160	0.197	0.182	0.055	0.114	0.057	0.044	0.088	0.163	0.151	0.169		
q16 Sleep	coef.	0.464	0.322	0.317	0.430	0.343	0.281	0.354	0.425	0.358	0.227	0.281	0.442	0.470	0.561	0.662		0.568	0.526	0.404	0.353	0.498	0.263	0.381	0.307	0.360	0.482	0.385	10.236	2
	l_95	0.359	0.213	0.191	0.292	0.262	0.190	0.240	0.318	0.248	0.097	0.189	0.336	0.361	0.445	0.556		0.443	0.397	0.320	0.262	0.357	0.165	0.260	0.211	0.257	0.389	0.292		
	u_95	0.569	0.432	0.443	0.568	0.424	0.372	0.468	0.531	0.468	0.357	0.373	0.549	0.579	0.677	0.769		0.692	0.654	0.489	0.444	0.640	0.361	0.502	0.402	0.463	0.576	0.478		
	t	8.69	5.80	4.96	6.13	8.31	6.09	6.10	7.85	6.39	3.43	6.03	8.16	8.50	9.49	12.24		8.98	8.05	9.43	7.65	6.94	5.27	6.19	6.29	6.87	10.14	8.15		
	R^2	0.198	0.099	0.074	0.109	0.184	0.109	0.108	0.167	0.117	0.037	0.108	0.178	0.191	0.228	0.332		0.208	0.175	0.225	0.160	0.197	0.083	0.111	0.114	0.133	0.251	0.178		
q17 Daily activities	coef.	0.112	0.078	0.305	0.372	0.141	0.090	0.193	0.280	0.087	0.327	0.141	0.157	0.240	0.250	0.371	0.367		0.767	0.207	0.143	0.243	0.007	0.145	0.117	0.221	0.175	0.132	3.881	22
	l_95	0.018	-0.014	0.206	0.262	0.071	0.013	0.099	0.191	-0.007	0.227	0.064	0.064	0.146	0.147	0.275	0.286		0.693	0.134	0.065	0.112	-0.075	0.043	0.036	0.136	0.090	0.051		
	u_95	0.205	0.170	0.404	0.482	0.212	0.167	0.288	0.368	0.181	0.427	0.217	0.250	0.333	0.353	0.467	0.447		0.841	0.280	0.221	0.374	0.089	0.247	0.198	0.307	0.259	0.213		
	t	2.36	1.66	6.04	6.68	3.94	2.31	4.02	6.23	1.82	6.45	3.61	3.33	5.05	4.79	7.58	8.98		20.39	5.56	3.62	3.65	0.17	2.80	2.85	5.09	4.06	3.22		
	R^2	0.018	0.009	0.106	0.127	0.048	0.017	0.050	0.112	0.011	0.119	0.041	0.035	0.077	0.070	0.160	0.208		0.575	0.092	0.041	0.064	0.000	0.025	0.026	0.078	0.051	0.033		
q18 Work capacity	coef.	0.116	0.107	0.300	0.318	0.138	0.058	0.212	0.225	0.039	0.432	0.147	0.105	0.216	0.251	0.408	0.332	0.749		0.205	0.151	0.312	0.015	0.109	0.105	0.190	0.182	0.101	4.331	21
	l_95	0.024	0.016	0.202	0.207	0.068	-0.018	0.120	0.136	-0.054	0.339	0.071	0.013	0.123	0.149	0.314	0.251	0.677		0.133	0.074	0.184	-0.067	0.008	0.025	0.105	0.098	0.020		
	u_95	0.208	0.197	0.398	0.428	0.207	0.134	0.305	0.314	0.133	0.525	0.222	0.198	0.309	0.352	0.501	0.413	0.822		0.278	0.228	0.441	0.096	0.210	0.185	0.275	0.265	0.181		
	t	2.47	2.31	6.01	5.67	3.89	1.50	4.50	4.96	0.83	9.12	3.82	2.23	4.57	4.86	8.61	8.05	20.39		5.57	3.85	4.80	0.35	2.12	2.58	4.38	4.28	2.46		
	R^2	0.020	0.017	0.105	0.095	0.047	0.007	0.062	0.074	0.002	0.213	0.046	0.016	0.064	0.072	0.197	0.175	0.575		0.092	0.046	0.105	0.000	0.015	0.021	0.059	0.056	0.019		
q19 Self satisfaction	coef.	0.614	0.273	0.231	0.398	0.450	0.484	0.334	0.487	0.479	0.298	0.560	0.579	0.579	0.482	0.579	0.557	0.444	0.449		0.468	0.373	0.313	0.402	0.222	0.430	0.421	0.493	10.647	1
	l_95	0.494	0.141	0.079	0.231	0.358	0.384	0.197	0.361	0.352	0.145	0.464	0.456	0.452	0.336	0.440	0.440	0.287	0.291		0.363	0.199	0.197	0.258	0.104	0.309	0.302	0.386		
	u_95	0.733	0.405	0.383	0.564	0.543	0.584	0.471	0.613	0.606	0.450	0.656	0.701	0.706	0.628	0.718	0.673	0.601	0.608		0.572	0.547	0.428	0.546	0.339	0.551	0.539	0.600		
	t	10.12	4.06	3.00	4.71	9.57	9.54	4.80	7.62	7.43	3.84	11.50	9.31	8.99	6.49	8.18	9.43	5.56	5.57		8.80	4.22	5.32	5.48	3.72	6.99	6.98	9.09		
	R^2	0.251	0.051	0.029	0.068	0.231	0.231	0.070	0.159	0.153	0.046	0.306	0.221	0.209	0.121	0.182	0.225	0.092	0.092		0.202	0.083	0.085	0.089	0.043	0.138	0.138	0.212		
q20 Relationships	coef.	0.402	0.162	0.076	0.093	0.348	0.267	0.407	0.378	0.346	0.031	0.294	0.331	0.375	0.446	0.307	0.453	0.285	0.306	0.432		0.524	0.508	0.566	0.366	0.428	0.426	0.325	7.928	6
	l_95	0.277	0.033	-0.071	-0.072	0.254	0.162	0.277	0.253	0.219	-0.119	0.188	0.203	0.245	0.305	0.163	0.336	0.130	0.150	0.336		0.353	0.407	0.435	0.258	0.312	0.313	0.215		
	u_95	0.527	0.291	0.224	0.258	0.442	0.373	0.537	0.503	0.473	0.181	0.399	0.459	0.505	0.587	0.451	0.569	0.440	0.463	0.529		0.696	0.609	0.696	0.474	0.544	0.539	0.435		
	t	6.34	2.47	1.02	1.11	7.28	4.99	6.14	5.94	5.36	0.41	5.49	5.09	5.66	6.22	4.20	7.65	3.62	3.85	8.80		6.04	9.89	8.52	6.68	7.26	7.43	5.81		
	R^2	0.116	0.019	0.003	0.004	0.147	0.076	0.110	0.103	0.086	0.001	0.091	0.078	0.095	0.112	0.055	0.160	0.041	0.046	0.202		0.157	0.242	0.191	0.127	0.147	0.153	0.099		

		q1 overall QoL	q2 Health	q3 Pain	q4 Medicine	q5 Enjoyment	q6 Life meaning	q7 Concentration	q8 Security	q9 Envir. healthy	q10 Energy	q11 Appearance	q12 Money	q13 Information	q14 Leisure	q15 Mobility	q16 Sleep	q17 Daily activities	q18 Work capacity	q19 Self satisfaction	q20 Relationships	q21 Sex life	q22 Support	q23 Living conditions	q24 Health serv. access	q25 Transport	q26 Depression	q27 Food enough	Sum of significant correlations	Rank of sum of significant correlations
q21 Sex life	coef.	*0.207*	*0.271*	*0.211*	*0.242*	*0.229*	*0.216*	*0.299*	0.191	*0.206*	*0.267*	*0.244*	*0.292*	*0.243*	*0.261*	**0.319**	**0.396**	*0.262*	**0.336**	*0.223*	*0.299*		**0.301**	*0.225*	*0.228*	0.194	**0.316**	0.113	3.742	23
	l_95	0.081	0.146	0.068	0.088	0.139	0.115	0.173	0.066	0.079	0.131	0.139	0.166	0.113	0.127	0.193	0.283	0.121	0.198	0.119	0.201		0.193	0.090	0.116	0.075	0.215	0.000		
	u_95	0.333	0.396	0.353	0.396	0.320	0.317	0.425	0.315	0.332	0.404	0.349	0.417	0.372	0.396	0.446	0.508	0.404	0.475	0.327	0.397		0.410	0.360	0.340	0.314	0.417	0.227		
	t	3.23	*4.29*	2.92	3.10	**5.01**	*4.21*	*4.67*	3.02	3.21	3.87	*4.58*	*4.57*	3.70	3.82	**4.97**	**6.94**	3.65	*4.80*	*4.22*	**6.04**		**5.46**	3.29	4.02	3.21	**6.16**	1.97		
	R^2	*0.051*	*0.086*	0.042	0.047	**0.114**	*0.084*	**0.101**	0.044	0.050	*0.071*	*0.098*	*0.096*	*0.065*	*0.070*	**0.114**	**0.197**	*0.064*	**0.105**	*0.083*	**0.157**		**0.132**	*0.053*	*0.076*	0.050	**0.162**	0.019		
q22 Support	coef.	**0.332**	0.137	0.012	0.016	0.189	0.173	0.199	*0.241*	*0.254*	-0.049	0.122	*0.286*	**0.360**	**0.411**	**0.304**	**0.316**	0.013	0.028	*0.271*	**0.476**	**0.439**		**0.496**	**0.344**	**0.308**	**0.324**	*0.242*	4.908	19
	l_95	0.209	0.012	-0.131	-0.144	0.093	0.069	0.068	0.116	0.128	-0.194	0.015	0.161	0.234	0.273	0.164	0.198	-0.140	-0.127	0.171	0.381	0.280		0.367	0.239	0.192	0.211	0.133		
	u_95	0.455	0.263	0.155	0.176	0.285	0.276	0.331	0.366	0.379	0.096	0.228	0.411	0.486	0.548	0.443	0.434	0.167	0.183	0.371	0.571	0.597		0.626	0.449	0.425	0.437	0.350		
	t	**5.31**	2.15	0.17	0.20	3.86	3.27	2.98	3.80	3.98	-0.67	2.25	*4.51*	**5.61**	**5.88**	*4.29*	**5.27**	0.17	0.35	**5.32**	**9.89**	**5.46**		**7.56**	**6.46**	**5.21**	**5.65**	*4.36*		
	R^2	*0.084*	0.015	0.000	0.000	0.046	0.034	0.028	0.045	0.049	0.002	0.017	*0.062*	*0.093*	**0.102**	*0.057*	*0.083*	0.000	0.000	*0.085*	**0.242**	**0.132**		**0.157**	**0.120**	*0.081*	*0.094*	*0.058*		
q23 Living conditions	coef.	**0.324**	0.135	0.071	-0.023	0.186	0.104	*0.236*	*0.261*	*0.290*	0.041	0.118	*0.271*	**0.303**	**0.314**	*0.211*	*0.291*	0.172	0.133	*0.222*	**0.338**	*0.233*	**0.316**		**0.370**	**0.348**	*0.261*	*0.228*	4.792	20
	l_95	0.228	0.035	-0.043	-0.151	0.110	0.020	0.134	0.163	0.192	-0.074	0.033	0.173	0.202	0.203	0.099	0.199	0.051	0.010	0.143	0.260	0.093	0.234		0.291	0.260	0.171	0.142		
	u_95	0.420	0.235	0.185	0.105	0.262	0.188	0.339	0.359	0.387	0.157	0.203	0.370	0.403	0.425	0.323	0.384	0.292	0.256	0.302	0.416	0.372	0.399		0.448	0.437	0.351	0.314		
	t	**6.64**	2.66	1.22	-0.36	*4.82*	2.44	*4.54*	**5.25**	**5.85**	0.70	2.73	**5.43**	**5.94**	**5.57**	3.71	**6.19**	2.80	2.12	**5.48**	**8.52**	3.29	**7.56**		**9.21**	**7.73**	**5.69**	**5.22**		
	R^2	**0.126**	0.023	0.005	0.000	*0.070*	0.019	*0.063*	*0.082*	**0.100**	0.002	0.024	*0.088*	**0.103**	*0.092*	0.044	**0.111**	0.025	0.015	*0.089*	**0.191**	*0.053*	**0.157**		**0.217**	**0.163**	*0.096*	*0.082*		
q24 Health serv.	coef.	**0.420**	0.183	0.094	0.051	0.197	0.125	**0.355**	**0.332**	*0.262*	0.149	0.088	*0.248*	**0.429**	**0.428**	**0.378**	**0.372**	*0.221*	*0.202*	0.195	**0.347**	**0.334**	**0.348**	**0.586**		**0.499**	*0.273*	*0.217*	5.029	18
	l_95	0.300	0.057	-0.050	-0.110	0.100	0.020	0.227	0.209	0.136	0.005	-0.019	0.122	0.305	0.290	0.240	0.256	0.068	0.048	0.092	0.245	0.170	0.242	0.461		0.391	0.158	0.106		
	u_95	0.540	0.308	0.237	0.212	0.293	0.230	0.482	0.455	0.388	0.294	0.195	0.375	0.553	0.566	0.515	0.489	0.373	0.356	0.298	0.449	0.498	0.454	0.711		0.608	0.389	0.327		
	t	**6.87**	2.87	1.28	0.62	4.01	2.34	**5.47**	**5.31**	*4.09*	2.03	1.63	3.86	**6.80**	**6.12**	**5.40**	**6.29**	2.85	2.58	3.72	**6.68**	4.02	**6.46**	**9.21**		**9.06**	*4.67*	3.87		
	R^2	**0.133**	0.026	0.005	0.001	0.050	0.018	*0.089*	*0.084*	*0.052*	0.013	0.009	0.046	**0.131**	**0.109**	*0.088*	**0.114**	0.026	0.021	0.043	**0.127**	*0.076*	**0.120**	**0.217**		**0.211**	*0.066*	0.047		
q25 Transport	coef.	**0.397**	0.125	0.097	*0.263*	*0.257*	0.123	**0.354**	**0.418**	*0.298*	*0.216*	*0.212*	**0.421**	**0.431**	**0.458**	**0.474**	**0.370**	**0.352**	**0.309**	**0.320**	**0.343**	*0.257*	*0.263*	**0.467**	**0.422**		**0.334**	**0.359**	7.260	13
	l_95	0.287	0.009	-0.035	0.118	0.171	0.027	0.238	0.310	0.183	0.084	0.116	0.311	0.318	0.334	0.352	0.264	0.216	0.170	0.230	0.250	0.099	0.164	0.348	0.331		0.231	0.264		
	u_95	0.507	0.241	0.229	0.408	0.343	0.220	0.470	0.527	0.412	0.348	0.308	0.530	0.543	0.582	0.595	0.476	0.488	0.448	0.410	0.436	0.415	0.363	0.586	0.514		0.437	0.455		
	t	**7.09**	2.12	1.45	3.57	**5.85**	2.51	**6.00**	**7.58**	**5.13**	3.22	*4.35*	**7.56**	**7.53**	**7.26**	**7.66**	**6.87**	**5.09**	*4.38*	**6.99**	**7.26**	3.21	**5.21**	**7.73**	**9.06**		**6.39**	**7.40**		
	R^2	**0.141**	0.014	0.007	0.040	**0.100**	0.020	**0.105**	**0.158**	*0.079*	0.033	*0.059*	**0.157**	**0.156**	**0.147**	**0.163**	**0.133**	*0.078*	*0.059*	**0.138**	**0.147**	0.050	*0.081*	**0.163**	**0.211**		**0.117**	**0.151**		
q26 Depress-ion	coef.	**0.474**	*0.271*	*0.216*	**0.361**	**0.329**	*0.280*	**0.336**	**0.350**	**0.411**	0.095	*0.233*	**0.443**	**0.417**	**0.632**	**0.466**	**0.520**	*0.292*	**0.310**	**0.327**	**0.358**	**0.513**	*0.291*	**0.367**	*0.242*	**0.351**		**0.353**	8.927	4
	l_95	0.365	0.156	0.082	0.215	0.243	0.185	0.216	0.236	0.298	-0.042	0.135	0.331	0.301	0.515	0.340	0.419	0.150	0.168	0.235	0.263	0.349	0.189	0.240	0.140	0.243		0.255		
	u_95	0.584	0.387	0.349	0.507	0.415	0.375	0.457	0.465	0.524	0.232	0.331	0.554	0.534	0.749	0.591	0.621	0.433	0.453	0.419	0.453	0.677	0.392	0.493	0.345	0.459		0.452		
	t	**8.54**	*4.62*	3.18	*4.86*	**7.56**	**5.80**	**5.49**	**6.02**	**7.17**	1.36	*4.67*	**7.81**	**7.05**	**10.59**	**7.32**	**10.14**	*4.06*	*4.28*	**6.98**	**7.43**	**6.16**	**5.65**	**5.69**	*4.67*	**6.39**		**7.05**		
	R^2	**0.192**	*0.065*	0.032	*0.071*	**0.157**	*0.100*	*0.090*	**0.106**	**0.144**	0.006	*0.068*	**0.166**	**0.139**	**0.268**	**0.151**	**0.251**	*0.051*	*0.056*	**0.138**	**0.153**	**0.162**	*0.094*	*0.096*	*0.066*	**0.117**		**0.140**		
q27 Food enough	coef.	**0.598**	*0.214*	0.168	*0.288*	**0.365**	**0.392**	*0.256*	**0.444**	**0.524**	0.132	**0.416**	**0.710**	**0.514**	**0.679**	**0.519**	**0.463**	*0.246*	0.192	**0.431**	**0.305**	0.171	*0.242*	**0.358**	*0.215*	**0.421**	**0.395**		7.773	9
	l_95	0.488	0.090	0.026	0.131	0.276	0.296	0.126	0.326	0.409	-0.013	0.320	0.609	0.394	0.555	0.388	0.351	0.096	0.038	0.338	0.202	-0.001	0.133	0.223	0.105	0.309	0.285			
	u_95	0.707	0.338	0.311	0.445	0.455	0.488	0.386	0.562	0.638	0.276	0.511	0.812	0.633	0.803	0.649	0.574	0.397	0.346	0.524	0.408	0.342	0.351	0.493	0.324	0.533	0.505			
	t	**10.73**	3.39	2.33	3.61	**8.02**	**8.02**	3.87	**7.41**	**9.00**	1.79	**8.55**	**13.79**	**8.47**	**10.75**	**7.83**	**8.15**	3.22	2.46	**9.09**	**5.81**	1.97	*4.36*	**5.22**	3.87	**7.40**	**7.05**			
	R^2	**0.273**	0.036	0.017	0.041	**0.173**	**0.175**	0.047	**0.152**	**0.209**	0.010	**0.196**	**0.383**	**0.189**	**0.274**	**0.169**	**0.178**	0.033	0.019	**0.212**	*0.099*	0.019	*0.058*	*0.082*	0.047	**0.151**	**0.140**			
Total R^2		3.786	1.337	1.364	1.603	3.180	2.336	1.960	2.785	2.680	1.178	2.562	3.611	3.527	3.500	3.362	3.897	1.616	2.201	3.634	2.614	2.125	1.686	2.023	1.901	2.648	3.020	3.361		

coef. = univariate linear regression coefficient; l_95 = lower 95% confidence interval; u_95 = upper 95% confidence interval; t = t statistic

satistical significance:
- **5.83** = associations equivalent to p<0.00001 significant
- **4.92** = associations equivalent to p<0.001 significant
- *4.03* = associations equivalent to p<0.05 significant

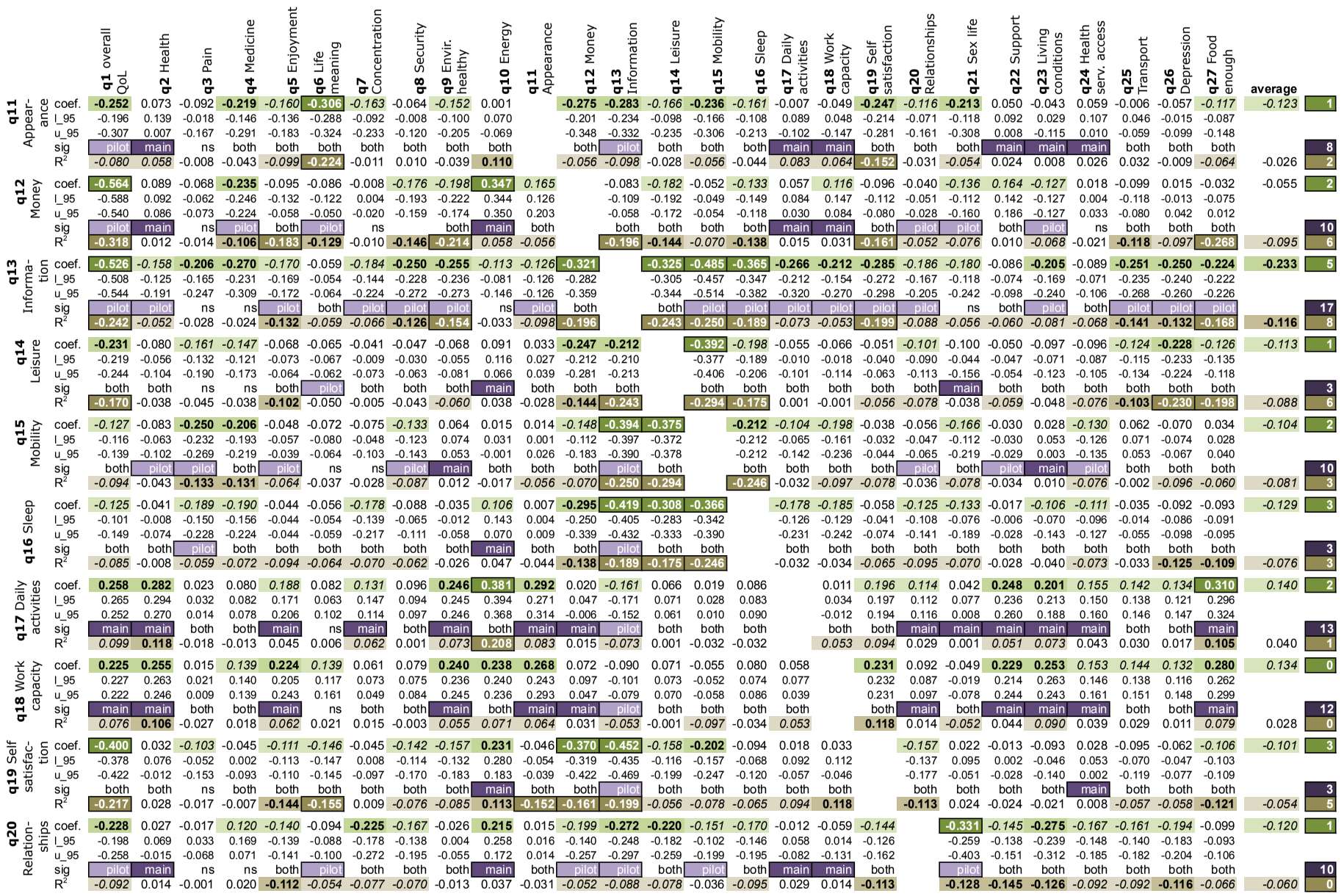
all after adjusting for 27*26=702 comparisons (Bonferroni correction)

- **0.400** > 0.4 correlation
- **0.300** 0.4 > 0.3 correlation
- *0.200* 0.3 > 0.2 correlation

- **0.150** > 0.150 R^2
- **0.100** 0.150 > 0.100 R^2
- *0.050* 0.100 > 0.050 R^2

Table N.3 Differences between main (n=534) and pilot (n=309) sample univariate regressions of each WHOQoL-BREF quality of life facet against each other

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	average	
q1 overall QoL	coef.		-0.023	-0.065	-0.041	-0.030	**-0.225**	-0.063	*-0.188*	**-0.210**	**0.235**	-0.082	**-0.567**	**-0.567**	**-0.306**	**-0.203**	-0.093	*0.156*	*0.111*	**-0.251**	*-0.149*	-0.042	-0.076	*-0.118*	*-0.162*	*-0.113*	*-0.168*	*-0.193*	*-0.132*	3
	l_95		0.006	-0.029	-0.007	-0.035	-0.230	-0.023	-0.172	-0.198	0.270	-0.089	-0.536	-0.561	-0.285	-0.170	-0.076	0.215	0.172	-0.244	-0.135	0.020	-0.070	-0.087	-0.152	-0.099	-0.165	-0.200		
	u_95		-0.051	-0.102	-0.075	-0.025	-0.220	-0.103	-0.203	-0.221	0.200	-0.076	-0.598	-0.574	-0.328	-0.236	-0.110	0.097	0.050	-0.258	-0.164	-0.105	-0.082	-0.150	-0.173	-0.127	-0.170	-0.186		
	sig		both	main	ns	both	pilot	both	both	both	main	pilot	pilot	pilot	both	both	both	main	main	both	pilot	main	pilot	both	pilot	both	both	both		12
	R^2		0.000	-0.018	-0.011	**-0.135**	**-0.151**	-0.013	**-0.132**	**-0.162**	*0.099*	*-0.080*	**-0.318**	**-0.242**	**-0.170**	*-0.094*	*-0.085*	*0.099*	*0.076*	**-0.217**	*-0.092*	-0.010	*-0.055*	*-0.055*	**-0.107**	*-0.085*	**-0.145**	**-0.215**	*-0.089*	7
q2 Health	coef.	0.026		**-0.203**	0.021	**0.205**	-0.004	0.080	**0.234**	*0.144*	*0.106*	**0.224**	-0.011	*-0.149*	-0.094	*-0.118*	0.015	**0.238**	*0.181*	0.073	0.055	*-0.115*	*0.146*	*0.179*	0.057	*0.119*	*0.117*	0.096	0.062	0
	l_95	0.046		-0.177	0.050	0.206	-0.008	0.117	0.257	0.163	0.132	0.219	0.036	-0.136	-0.068	-0.087	0.032	0.295	0.240	0.088	0.070	-0.063	0.152	0.214	0.069	0.134	0.124	0.096		
	u_95	0.005		-0.229	-0.007	0.204	0.000	0.043	0.211	0.124	0.080	0.229	-0.058	-0.162	-0.120	-0.150	-0.002	0.181	0.122	0.058	0.040	-0.166	0.140	0.144	0.045	0.103	0.110	0.096		
	sig	both		both	both	both	ns	main	main	main	both	main	main	pilot	both	pilot	both	main	main	both	main	both	main	main	main	main	both	main		15
	R^2	0.000		**-0.102**	0.003	*0.080*	-0.012	0.028	*0.077*	0.047	0.049	*0.058*	0.012	*-0.052*	-0.038	-0.043	-0.008	**0.118**	**0.106**	0.028	0.014	*-0.051*	0.036	*0.077*	0.012	0.031	0.027	0.014	0.020	0
q3 Pain	coef.	-0.024	*-0.147*		*-0.157*	0.030	-0.034	-0.041	-0.066	0.059	-0.069	0.021	-0.078	*-0.184*	*-0.159*	**-0.255**	*-0.113*	-0.080	*-0.103*	-0.033	0.001	*-0.110*	0.002	0.019	0.014	0.074	0.077	0.035	-0.051	0
	l_95	-0.008	-0.131		-0.151	0.025	-0.040	-0.012	-0.053	0.072	-0.055	0.011	-0.039	-0.174	-0.139	-0.234	-0.102	-0.040	-0.060	-0.023	0.012	-0.067	0.003	0.045	0.022	0.085	0.079	0.031		
	u_95	-0.040	-0.163		-0.163	0.036	-0.029	-0.070	-0.080	0.046	-0.084	0.031	-0.117	-0.194	-0.179	-0.276	-0.124	-0.119	-0.145	-0.043	-0.010	-0.153	0.001	-0.006	0.005	0.064	0.074	0.038		
	sig	main	both		both	ns	ns	ns	ns	ns	both	ns	ns	ns	ns	pilot	pilot	both	both	ns	ns	ns	ns	ns	ns	ns	main	ns		4
	R^2	-0.018	**-0.102**		**-0.188**	-0.003	-0.003	-0.007	-0.020	0.009	*-0.059*	-0.008	-0.014	-0.028	-0.045	**-0.133**	*-0.059*	-0.018	-0.027	-0.017	-0.001	-0.034	0.000	0.003	0.000	0.014	0.012	-0.001	-0.029	1
q4 Medicine	coef.	-0.024	-0.004	*-0.187*		-0.034	-0.080	0.061	-0.062	0.076	0.080	-0.019	**-0.209**	*-0.193*	*-0.123*	*-0.197*	-0.099	-0.088	-0.051	0.001	0.069	*-0.152*	0.014	*0.176*	0.031	0.069	-0.006	0.084	-0.033	0
	l_95	-0.003	0.020	-0.171		-0.034	-0.080	0.093	-0.045	0.093	0.105	-0.024	-0.175	-0.178	-0.099	-0.174	-0.085	-0.048	-0.007	0.014	0.084	-0.102	0.021	0.205	0.044	0.084	0.001	0.088		
	u_95	-0.044	-0.028	-0.202		-0.035	-0.081	0.029	-0.079	0.058	0.056	-0.014	-0.244	-0.209	-0.147	-0.221	-0.113	-0.128	-0.096	-0.012	0.054	-0.202	0.008	0.146	0.018	0.054	-0.012	0.081		
	sig	ns	both	both		ns	ns	main	pilot	main	both	both	pilot	ns	ns	both	both	both	both	both	ns	ns	ns	main	ns	main	both	main		7
	R^2	-0.011	0.003	*-0.188*		-0.007	-0.016	0.024	-0.031	0.028	*0.052*	-0.043	**-0.106**	-0.024	-0.038	**-0.131**	*-0.072*	-0.013	0.018	-0.007	0.020	-0.044	0.001	0.036	0.004	0.031	-0.024	0.023	-0.020	1
q5 Enjoyment	coef.	**-0.306**	-0.001	-0.071	*-0.110*		**-0.249**	**-0.252**	*-0.149*	*-0.178*	*0.122*	*-0.161*	**-0.471**	**-0.373**	**-0.330**	**-0.272**	**-0.237**	-0.058	-0.041	**-0.257**	**-0.255**	*-0.196*	-0.007	-0.079	-0.026	*-0.166*	*-0.192*	*-0.193*	*-0.173*	4
	l_95	-0.261	0.064	0.004	-0.034		-0.232	-0.184	-0.098	-0.130	0.191	-0.142	-0.403	-0.328	-0.269	-0.201	-0.191	0.037	0.059	-0.223	-0.216	-0.089	0.030	-0.008	0.018	-0.120	-0.159	-0.168		
	u_95	-0.351	-0.065	-0.145	-0.186		-0.266	-0.321	-0.201	-0.225	0.052	-0.179	-0.539	-0.417	-0.391	-0.343	-0.282	-0.153	-0.140	-0.292	-0.294	-0.303	-0.045	-0.150	-0.070	-0.211	-0.226	-0.218		
	sig	both	both	ns	ns		both	both	both	both	main	both	both	pilot	both	pilot	both	main	main	both	both	both	main	both	main	both	both	both		7
	R^2	**-0.135**	*0.080*	-0.003	-0.007		**-0.181**	*-0.062*	-0.035	*-0.056*	*0.057*	*-0.099*	**-0.183**	**-0.132**	**-0.102**	*-0.064*	*-0.094*	0.045	*0.062*	**-0.144**	**-0.112**	-0.030	0.005	0.015	0.006	*-0.052*	*-0.090*	**-0.109**	*-0.055*	2
q6 Life meaning	coef.	**-0.401**	-0.092	-0.069	*-0.190*	**-0.212**		*-0.194*	-0.041	**-0.238**	0.042	**-0.280**	**-0.372**	*-0.187*	**-0.223**	**-0.211**	*-0.186*	-0.060	0.019	**-0.252**	*-0.159*	*-0.188*	-0.056	-0.056	*-0.105*	-0.068	**-0.229**	**-0.250**	*-0.164*	2
	l_95	-0.355	-0.032	0.002	-0.119	-0.199		-0.128	0.012	-0.194	0.106	-0.271	-0.303	-0.140	-0.161	-0.140	-0.140	0.030	0.113	-0.220	-0.119	-0.091	-0.021	0.011	-0.064	-0.022	-0.196	-0.228		
	u_95	-0.447	-0.152	-0.141	-0.261	-0.226		-0.261	-0.094	-0.282	-0.022	-0.289	-0.441	-0.235	-0.286	-0.282	-0.233	-0.149	-0.075	-0.283	-0.199	-0.285	-0.091	-0.123	-0.147	-0.115	-0.262	-0.272		
	sig	pilot	ns	ns	ns	both		both	both	both	main	both	pilot	both	pilot	ns	both	ns	ns	both	pilot	both	ns	ns	ns	ns	pilot	pilot	both	6
	R^2	**-0.151**	-0.012	-0.003	-0.016	**-0.181**		-0.031	0.011	*-0.093*	0.020	**-0.224**	**-0.129**	*-0.059*	-0.050	-0.037	*-0.064*	0.006	0.021	**-0.155**	*-0.054*	-0.041	-0.014	-0.002	-0.016	-0.011	*-0.085*	**-0.140**	*-0.058*	4
q7 Concentra-tion	coef.	0.013	*0.107*	-0.040	*0.147*	0.000	0.090		-0.055	*0.102*	*0.199*	*0.131*	-0.051	*-0.127*	0.038	-0.071	-0.088	0.087	-0.011	0.062	-0.086	-0.065	0.009	-0.041	*-0.128*	-0.059	-0.049	*0.198*	0.012	0
	l_95	0.023	0.127	-0.017	0.166	-0.015	0.076		-0.052	0.110	0.216	0.113	-0.013	-0.124	0.054	-0.048	-0.083	0.131	0.033	0.069	-0.084	-0.022	0.004	-0.021	-0.129	-0.057	-0.057	0.190		
	u_95	0.002	0.088	-0.064	0.128	0.014	0.104		-0.059	0.095	0.182	0.148	-0.089	-0.129	0.022	-0.095	-0.094	0.043	-0.056	0.056	-0.088	-0.107	0.015	-0.061	-0.127	-0.061	-0.042	0.206		
	sig	both	main	ns	main	both	both		both	both	both	both	ns	pilot	both	ns	both	main	both	both	both	both	ns	both	pilot	both	both	main		6
	R^2	-0.013	0.028	-0.007	0.024	*-0.062*	-0.031		**-0.101**	0.016	*0.075*	-0.011	-0.010	*-0.066*	-0.005	-0.028	*-0.070*	*0.062*	0.015	0.009	*-0.077*	-0.045	-0.012	-0.024	*-0.076*	*-0.062*	*-0.058*	0.048	-0.018	0
q8 Security	coef.	**-0.205**	*0.176*	*-0.104*	*-0.113*	0.024	0.074	*-0.187*		-0.035	*0.148*	0.091	**-0.301**	**-0.258**	-0.099	**-0.212**	-0.081	*-0.101*	-0.096	-0.086	*-0.114*	-0.037	-0.005	*-0.130*	-0.085	*-0.146*	*-0.113*	*-0.120*	-0.081	1
	l_95	-0.184	0.213	-0.064	-0.077	0.027	0.079	-0.153		-0.014	0.184	0.093	-0.258	-0.241	-0.066	-0.176	-0.060	-0.046	-0.037	-0.070	-0.096	0.029	0.006	-0.094	-0.069	-0.130	-0.103	-0.118		
	u_95	-0.226	0.139	-0.144	-0.149	0.022	0.068	-0.220		-0.055	0.112	0.090	-0.344	-0.275	-0.131	-0.248	-0.102	-0.156	-0.154	-0.103	-0.132	-0.104	-0.017	-0.165	-0.101	-0.161	-0.122	-0.121		
	sig	both	main	ns	pilot	both	both	both		both	main	both		pilot	both	pilot	both	both	both	both	both	main	main	both	both	both	both	both		7
	R^2	**-0.132**	*0.077*	-0.020	-0.031	-0.035	0.011	**-0.101**		-0.039	*0.080*	0.010	**-0.146**	**-0.126**	-0.043	*-0.087*	*-0.062*	0.001	-0.003	*-0.076*	*-0.070*	-0.005	-0.013	-0.047	*-0.051*	**-0.103**	*-0.074*	**-0.109**	-0.046	0
q9 Envir. healthy	coef.	**-0.238**	0.078	0.036	0.080	0.004	-0.082	-0.044	-0.055		**0.391**	0.011	**-0.363**	**-0.265**	*-0.139*	-0.014	-0.046	*0.127*	*0.146*	*-0.107*	-0.020	-0.048	-0.039	0.041	0.001	-0.036	*-0.126*	*-0.112*	-0.031	2
	l_95	-0.217	0.115	0.079	0.122	0.007	-0.079	-0.001	-0.031		0.434	0.012	-0.323	-0.248	-0.105	0.033	-0.021	0.189	0.211	-0.090	0.002	0.017	-0.026	0.083	0.022	-0.013	-0.115	-0.110		
	u_95	-0.259	0.041	-0.008	0.038	0.001	-0.084	-0.086	-0.080		0.348	0.011	-0.402	-0.282	-0.173	-0.060	-0.071	0.065	0.082	-0.125	-0.041	-0.113	-0.052	-0.001	-0.019	-0.058	-0.136	-0.114		
	sig	both	main	ns	main	both	both	both	both		main	both	both	pilot	both	main	both	main	main	both	both	main	ns	both	both	both	both	both		8
	R^2	**-0.162**	0.047	0.009	0.028	*-0.056*	*-0.093*	0.016	-0.039		**0.165**	-0.039	**-0.214**	**-0.154**	*-0.060*	0.012	-0.026	*0.073*	*0.055*	*-0.085*	-0.013	-0.009	-0.024	*0.063*	-0.003	-0.022	*-0.096*	**-0.132**	-0.029	4
q10 Energy	coef.	*0.180*	0.034	*-0.118*	0.083	*0.149*	0.086	0.053	*0.131*	**0.345**		**0.222**	*0.132*	-0.081	0.069	-0.058	0.090	0.098	-0.070	*0.146*	*0.134*	-0.085	*0.194*	**0.270**	*0.153*	*0.126*	*0.168*	**0.283**	*0.105*	1
	l_95	0.208	0.063	-0.088	0.116	0.153	0.089	0.090	0.156	0.372		0.225	0.178	-0.063	0.101	-0.025	0.112	0.153	-0.021	0.166	0.152	-0.028	0.204	0.307	0.171	0.146	0.180	0.293		
	u_95	0.152	0.006	-0.148	0.050	0.145	0.082	0.015	0.107	0.318		0.218	0.085	-0.099	0.038	-0.091	0.067	0.044	-0.119	0.126	0.115	-0.142	0.184	0.233	0.136	0.107	0.156	0.273		
	sig	main	both	both	both	main	main	both	main	main		both	main	ns	main	both	main	both	both	main	main	main	main	main	main	main	main	main		17
	R^2	*0.099*	0.049	*-0.059*	*0.052*	*0.057*	0.020	*0.075*	*0.080*	**0.165**		**0.110**	*0.058*	-0.033	0.038	-0.017	0.047	0.208	*0.071*	**0.113**	0.037	-0.030	0.031	**0.118**	*0.071*	*0.064*	*0.052*	**0.130**	*0.062*	2


q1 overall QoL
q2 Health
q3 Pain
q4 Medicine
q5 Enjoyment
q6 Life meaning
q7 Concentration
q8 Security
q9 Envir. healthy
q10 Energy
q11 Appearance
q12 Money
q13 Information
q14 Leisure
q15 Mobility
q16 Sleep
q17 Daily activities
q18 Work capacity
q19 Self satisfaction
q20 Relationships
q21 Sex life
q22 Support
q23 Living conditions
q24 Health serv. access
q25 Transport
q26 Depression
q27 Food enough
average
q11 Appear-ance
q12 Money
q13 Informa-tion
q14 Leisure
q15 Mobility
q16 Sleep
q17 Daily activities
q18 Work capacity
q19 Self satisfac-tion
q20 Relation-ships
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		q1 overall QoL	q2 Health	q3 Pain	q4 Medicine	q5 Enjoyment	q6 Life meaning	q7 Concentration	q8 Security	q9 Envir. healthy	q10 Energy	q11 Appearance	q12 Money	q13 Information	q14 Leisure	q15 Mobility	q16 Sleep	q17 Daily activities	q18 Work capacity	q19 Self satisfaction	q20 Relationships	q21 Sex life	q22 Support	q23 Living conditions	q24 Health serv. access	q25 Transport	q26 Depression	q27 Food enough	average	
q21 Sex life	coef.	-0.004	-0.098	*-0.126*	*-0.180*	0.052	-0.004	-0.094	0.012	0.003	-0.042	-0.009	*-0.185*	*-0.138*	-0.069	*-0.131*	-0.047	-0.035	*-0.133*	0.049	*-0.148*		0.043	*0.111*	-0.020	0.039	0.058	*0.159*	-0.036	0
	l_95	0.035	-0.054	-0.071	-0.134	0.059	0.007	-0.043	0.048	0.039	-0.003	-0.001	-0.124	-0.105	-0.028	-0.091	-0.015	0.029	-0.071	0.084	-0.128		0.066	0.164	0.010	0.071	0.069	0.179		
	u_95	-0.043	-0.141	-0.182	-0.225	0.044	-0.016	-0.145	-0.024	-0.033	-0.081	-0.017	-0.245	-0.170	-0.110	-0.171	-0.078	-0.100	-0.195	0.015	-0.169		0.020	0.059	-0.050	0.006	0.047	0.139		
	sig	main	both	ns	ns	both	both	both	main	main	main	both	pilot	ns	main	both	both	main	both	both	pilot		both	main	main	main	both	main		12
	R^2	-0.010	*-0.051*	-0.034	-0.044	-0.030	-0.041	-0.045	-0.005	-0.009	-0.030	*-0.054*	*-0.076*	*-0.056*	-0.038	*-0.078*	*-0.070*	0.001	*-0.052*	0.024	**-0.128**		-0.019	*0.064*	-0.028	0.004	-0.042	0.043	-0.031	0
q22 Support	coef.	*-0.168*	0.064	-0.003	0.015	0.026	-0.029	-0.090	-0.065	-0.094	**0.246**	0.098	-0.098	*-0.165*	*-0.194*	*-0.155*	-0.093	*0.186*	*0.155*	-0.068	**-0.210**	*-0.110*		*-0.191*	-0.082	-0.026	0.017	-0.001	-0.040	0
	l_95	-0.126	0.116	0.057	0.075	0.044	-0.011	-0.030	-0.023	-0.054	0.299	0.113	-0.030	-0.128	-0.144	-0.097	-0.054	0.265	0.238	-0.036	-0.184	-0.034		-0.141	-0.051	0.011	0.046	0.021		
	u_95	-0.211	0.013	-0.063	-0.044	0.009	-0.048	-0.149	-0.108	-0.134	0.192	0.082	-0.165	-0.202	-0.244	-0.213	-0.132	0.106	0.072	-0.100	-0.235	-0.187		-0.241	-0.112	-0.063	-0.011	-0.022		
	sig	pilot	main	ns	ns	main	ns	ns	main	ns	main	main	both	both	both	pilot	both	main	main	both	both	both		both	both	both	both	both		9
	R^2	*-0.055*	0.036	0.000	0.001	0.005	-0.014	-0.012	-0.013	-0.024	0.031	0.024	0.010	*-0.060*	*-0.059*	-0.034	-0.028	*0.051*	0.044	-0.024	**-0.145**	-0.019		*-0.059*	-0.037	0.002	0.013	-0.006	-0.014	0
q23 Living conditions	coef.	-0.063	*0.152*	0.017	**0.254**	0.099	0.033	-0.064	-0.071	*0.131*	**0.345**	0.081	*-0.169*	*-0.141*	-0.088	0.017	-0.031	*0.111*	*0.154*	-0.002	*-0.114*	*0.113*	0.005		-0.098	-0.045	0.032	*0.133*	0.031	1
	l_95	-0.048	0.178	0.046	0.281	0.095	0.030	-0.035	-0.057	0.147	0.371	0.073	-0.132	-0.133	-0.066	0.047	-0.018	0.158	0.205	0.009	-0.108	0.168	0.004		-0.096	-0.037	0.034	0.132		
	u_95	-0.078	0.126	-0.011	0.228	0.103	0.037	-0.093	-0.084	0.115	0.319	0.089	-0.207	-0.149	-0.109	-0.013	-0.043	0.063	0.103	-0.012	-0.119	0.059	0.005		-0.101	-0.052	0.030	0.134		
	sig	both	main	ns	main	both	ns	both	both	both	main	main	pilot	pilot	both	main	both	main	main	both	both	main	both		both	both	both	both		10
	R^2	*-0.055*	*0.077*	0.003	0.036	0.015	-0.002	-0.024	-0.047	*0.063*	**0.118**	0.008	*-0.068*	*-0.081*	-0.048	0.010	-0.040	*0.073*	*0.090*	-0.021	**-0.126**	*0.064*	*-0.059*		**-0.132**	*-0.071*	-0.021	0.030	-0.008	0
q24 Health serv. access	coef.	**-0.250**	0.007	-0.013	0.042	0.048	-0.080	**-0.249**	*-0.136*	-0.016	*0.197*	*0.133*	*-0.127*	*-0.136*	**-0.220**	**-0.263**	*-0.162*	0.032	0.029	0.009	*-0.172*	*-0.100*	-0.033	**-0.276**		**-0.212**	-0.063	-0.093	-0.081	0
	l_95	-0.218	0.051	0.040	0.093	0.058	-0.069	-0.200	-0.103	0.017	0.244	0.140	-0.065	-0.108	-0.178	-0.215	-0.132	0.105	0.105	0.037	-0.148	-0.029	-0.017	-0.238		-0.191	-0.044	-0.080		
	u_95	-0.282	-0.037	-0.065	-0.009	0.037	-0.091	-0.297	-0.168	-0.049	0.150	0.126	-0.189	-0.164	-0.261	-0.311	-0.191	-0.040	-0.046	-0.019	-0.196	-0.172	-0.050	-0.314		-0.233	-0.082	-0.105		
	sig	pilot	main	ns	ns	main	ns	pilot	both	both	main	main	ns	both	both	pilot	both	main	main	main	both	main	both	both		both	both	ns		11
	R^2	**-0.107**	0.012	0.000	0.004	0.006	-0.016	*-0.076*	*-0.051*	-0.003	*0.071*	0.026	-0.021	*-0.068*	*-0.076*	*-0.076*	*-0.073*	0.043	0.039	0.008	*-0.092*	-0.028	-0.037	**-0.132**		**-0.139**	-0.033	-0.035	-0.033	0
q25 Transport	coef.	*-0.165*	0.070	0.046	0.059	-0.043	-0.021	*-0.173*	*-0.182*	-0.048	*0.130*	*0.123*	**-0.278**	**-0.300**	**-0.231**	-0.078	-0.061	-0.056	-0.046	-0.081	*-0.137*	-0.026	0.033	*-0.164*	*-0.170*		-0.052	-0.045	-0.073	0
	l_95	-0.136	0.110	0.094	0.105	-0.038	-0.012	-0.129	-0.157	-0.020	0.171	0.129	-0.229	-0.279	-0.196	-0.034	-0.034	0.008	0.021	-0.060	-0.117	0.046	0.049	-0.126	-0.155		-0.037	-0.038		
	u_95	-0.194	0.030	-0.002	0.013	-0.049	-0.031	-0.216	-0.207	-0.075	0.089	0.118	-0.328	-0.320	-0.266	-0.122	-0.088	-0.119	-0.112	-0.102	-0.158	-0.097	0.017	-0.201	-0.185		-0.067	-0.053		
	sig	both	main	ns	main	both	ns	both	both	both	main	both	both	pilot	both	both	both	both	both	both	main	both	both	both		both	both		5
	R^2	*-0.085*	0.031	0.014	0.031	*-0.052*	-0.011	*-0.062*	**-0.103**	-0.022	*0.064*	0.032	**-0.118**	**-0.141**	**-0.103**	-0.002	-0.033	0.030	0.029	*-0.057*	*-0.092*	0.004	0.002	*-0.071*	**-0.139**		-0.048	*-0.067*	-0.037	0
q26 Depress-ion	coef.	**-0.276**	-0.013	-0.019	*-0.115*	-0.094	*-0.162*	*-0.193*	*-0.183*	*-0.200*	*0.157*	0.016	**-0.267**	**-0.330**	**-0.435**	**-0.251**	*-0.197*	-0.072	-0.096	*-0.105*	**-0.202**	*-0.191*	0.022	*-0.111*	-0.082	*-0.105*		-0.012	*-0.135*	2
	l_95	-0.242	0.033	0.037	-0.063	-0.083	-0.149	-0.140	-0.147	-0.168	0.208	0.028	-0.211	-0.300	-0.401	-0.203	-0.169	0.000	-0.021	-0.077	-0.176	-0.104	0.046	-0.061	-0.053	-0.074		0.005		
	u_95	-0.309	-0.060	-0.074	-0.168	-0.105	-0.175	-0.245	-0.218	-0.231	0.107	0.003	-0.323	-0.360	-0.468	-0.300	-0.226	-0.144	-0.170	-0.132	-0.229	-0.278	-0.003	-0.161	-0.111	-0.137		-0.030		
	sig	both	both	main	both	both	pilot	both	both	both	main	both	both	pilot	both	both	both	both	both	both	both	both	both	both	both	both		both		4
	R^2	**-0.145**	0.027	0.012	-0.024	*-0.090*	*-0.085*	*-0.058*	*-0.074*	*-0.096*	*0.052*	-0.009	*-0.097*	**-0.132**	**-0.230**	*-0.096*	**-0.125**	0.017	0.011	*-0.058*	**-0.116**	-0.042	0.013	-0.021	-0.033	-0.048		-0.025	*-0.057*	1
q27 Food enough	coef.	**-0.380**	-0.025	-0.049	-0.004	*-0.136*	**-0.213**	-0.008	**-0.249**	**-0.256**	**0.257**	-0.043	**-0.485**	**-0.367**	**-0.405**	**-0.217**	**-0.225**	0.064	0.065	*-0.195*	*-0.156*	0.059	-0.025	-0.048	*-0.121*	*-0.151*	-0.059		*-0.130*	4
	l_95	-0.345	0.029	0.014	0.060	-0.121	-0.197	0.057	-0.209	-0.221	0.320	-0.029	-0.437	-0.332	-0.362	-0.161	-0.188	0.148	0.152	-0.165	-0.121	0.151	0.005	0.012	-0.086	-0.115	-0.028			
	u_95	-0.414	-0.079	-0.113	-0.069	-0.151	-0.229	-0.072	-0.289	-0.291	0.195	-0.057	-0.533	-0.401	-0.448	-0.274	-0.263	-0.021	-0.022	-0.225	-0.191	-0.033	-0.055	-0.109	-0.157	-0.187	-0.089			
	sig	both	main	ns	main	both	both	main	both	both	main	both	both	pilot	both	both	both	main	main	both	both	main	both	both	ns	both	both			8
	R^2	**-0.215**	0.014	-0.001	0.023	**-0.109**	**-0.140**	0.048	**-0.109**	**-0.132**	**0.130**	*-0.064*	**-0.268**	**-0.168**	**-0.198**	*-0.060*	**-0.109**	**0.105**	*0.079*	**-0.121**	*-0.066*	0.043	-0.006	0.030	-0.035	*-0.067*	-0.025		*-0.055*	4
Total R^2		-2.392	0.405	-0.718	-0.533	-1.482	-1.529	-0.495	-1.189	-0.814	1.535	-0.742	-2.494	-2.956	-2.280	-2.020	-1.952	0.985	0.728	-1.531	-1.576	-0.749	-0.416	-0.297	-0.893	-0.996	-1.483	-1.499		

coef. = univariate linear regression coefficient; l_95 = lower 95% confidence interval; u_95 = upper 95% confidence interval; sig = statistical significance

statistical significance:
- main = associations that are at least p<0.05 equivalent significant in the main study ONLY
- pilot = associations that are at least p<0.05 equivalent significant in the pilot study ONLY
- both = association significant in both the main AND the pilot studies
- ns = association that are not significant in the main AND the pilot studies

- **0.300** > |0.4| difference in correlation between the main and pilot studies
- **0.200** |0.3| > |0.2| difference in correlation between the main and pilot studies
- *0.100* |0.2| > |0.1| difference in correlation between the main and pilot studies

- **0.150** > |0.150| difference in R^2 values between the main and pilot studies
- **0.100** |0.150| > |0.100| R^2 difference in R2 values between the main and pilot studies
- *0.050* |0.100| > |0.050| R^2 difference in R2 values between the main and pilot studies

no. of large differences in correlation	40
no. of differences in significance	237
no. of large differences in R^2 values	60

Table N.4 Univariate regressions of each WHOQoL-BREF quality of life facet against each other (combined main and pilot studies, n=843)

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q1 overall QoL	coef.		**0.363**	0.160	0.198	**0.373**	*0.204*	0.188	*0.292*	**0.323**	*0.284*	*0.245*	*0.241*	0.140	*0.279*	*0.276*	**0.350**	*0.240*	*0.226*	*0.244*	0.180	*0.204*	*0.223*	*0.279*	0.186	*0.276*	**0.316**	**0.369**	6.517	
	l_95		0.304	0.088	0.116	0.316	0.137	0.126	0.226	0.257	0.209	0.174	0.176	0.065	0.208	0.209	0.289	0.173	0.160	0.189	0.122	0.129	0.156	0.212	0.124	0.212	0.247	0.299		
	u_95		0.422	0.231	0.280	0.430	0.272	0.250	0.357	0.390	0.359	0.315	0.305	0.214	0.350	0.343	0.412	0.306	0.291	0.299	0.237	0.279	0.289	0.347	0.247	0.340	0.385	0.439		
	t		**12.04**	*4.39*	*4.76*	**12.81**	**5.92**	**5.92**	**8.77**	**9.54**	**7.43**	**6.78**	**7.30**	3.70	**7.67**	**8.04**	**11.22**	**7.08**	**6.73**	**8.70**	**6.12**	**5.37**	**6.59**	**8.12**	**5.94**	**8.41**	**9.01**	**10.34**		
	R^2		**0.147**	0.022	0.026	**0.163**	0.040	0.040	*0.084*	*0.098*	*0.062*	*0.052*	*0.060*	0.016	*0.065*	*0.072*	**0.130**	*0.056*	*0.051*	*0.083*	0.043	0.040	0.049	*0.073*	0.040	*0.078*	*0.088*	**0.113**		
q2 Health	coef.	**0.405**		**0.327**	*0.299*	**0.371**	0.073	0.189	*0.243*	*0.247*	**0.493**	*0.212*	0.056	0.107	*0.231*	0.195	**0.309**	**0.300**	*0.297*	*0.208*	0.150	*0.234*	0.171	**0.304**	0.191	0.183	*0.267*	0.161	5.985	15
	l_95	0.339		0.254	0.214	0.310	0.000	0.124	0.173	0.175	0.418	0.136	-0.015	0.029	0.155	0.122	0.243	0.231	0.229	0.149	0.089	0.156	0.100	0.233	0.126	0.113	0.193	0.083		
	u_95	0.471		0.400	0.384	0.431	0.146	0.255	0.313	0.319	0.568	0.287	0.126	0.186	0.308	0.268	0.375	0.369	0.365	0.267	0.212	0.312	0.241	0.375	0.255	0.252	0.341	0.239		
	t	**12.04**		**8.80**	**6.89**	**11.93**	1.95	**5.65**	**6.79**	**6.74**	**12.94**	**5.50**	1.55	2.68	**5.94**	**5.26**	**9.15**	**8.53**	**8.54**	**6.91**	*4.81*	**5.87**	*4.73*	**8.37**	**5.79**	**5.15**	**7.07**	*4.06*		
	R^2	**0.147**		*0.084*	*0.054*	**0.145**	0.005	0.037	*0.052*	*0.051*	**0.166**	0.035	0.003	0.009	0.040	0.032	*0.091*	*0.080*	*0.080*	*0.054*	0.027	0.048	0.026	*0.077*	0.038	0.031	*0.056*	0.019		
q3 Pain	coef.	0.140	*0.258*		**0.558**	0.115	-0.047	0.106	0.090	0.085	**0.347**	0.060	-0.061	-0.026	0.116	0.181	0.150	**0.315**	*0.291*	0.066	0.038	0.123	-0.033	0.103	0.079	0.101	0.133	0.035	2.239	27
	l_95	0.077	0.200		0.490	0.057	-0.112	0.047	0.026	0.019	0.278	-0.008	-0.124	-0.096	0.047	0.116	0.089	0.254	0.231	0.013	-0.017	0.050	-0.096	0.038	0.021	0.039	0.066	-0.035		
	u_95	0.203	0.315		0.625	0.173	0.018	0.165	0.154	0.150	0.416	0.128	0.001	0.044	0.185	0.246	0.211	0.375	0.351	0.120	0.094	0.196	0.031	0.169	0.138	0.164	0.200	0.105		
	t	*4.39*	**8.80**		**16.15**	3.89	-1.42	3.51	2.77	2.54	**9.90**	1.73	-1.93	-0.72	3.31	**5.50**	*4.84*	**10.21**	**9.48**	2.42	1.37	3.30	-1.01	3.10	2.67	3.18	3.90	0.98		
	R^2	0.022	*0.084*		**0.237**	0.018	0.002	0.015	0.009	0.008	**0.105**	0.004	0.004	0.001	0.013	0.035	0.027	**0.111**	*0.097*	0.007	0.002	0.016	0.001	0.011	0.008	0.012	0.018	0.001		
q4 Medicine	coef.	0.133	0.179	**0.425**		0.027	0.026	0.109	0.137	0.164	**0.305**	0.167	0.129	0.000	0.102	*0.236*	0.184	*0.278*	*0.261*	0.171	0.092	0.078	0.018	0.107	0.047	*0.200*	0.194	*0.201*	3.473	26
	l_95	0.078	0.128	0.373		-0.024	-0.031	0.058	0.082	0.108	0.245	0.108	0.075	-0.061	0.042	0.181	0.131	0.226	0.209	0.125	0.044	0.015	-0.037	0.050	-0.004	0.147	0.136	0.142		
	u_95	0.187	0.230	0.476		0.078	0.082	0.160	0.193	0.220	0.365	0.225	0.183	0.061	0.162	0.291	0.236	0.331	0.314	0.216	0.140	0.140	0.074	0.164	0.098	0.253	0.251	0.261		
	t	*4.76*	**6.89**	**16.15**		1.04	0.89	*4.16*	**4.90**	**5.73**	**9.98**	**5.59**	*4.70*	-0.01	3.32	**8.44**	**6.89**	**10.38**	**9.82**	**7.36**	3.79	2.43	0.65	3.69	1.80	**7.40**	**6.62**	**6.66**		
	R^2	0.026	*0.054*	**0.237**		0.001	0.001	0.020	0.028	0.038	**0.106**	0.036	0.026	0.000	0.013	*0.079*	*0.054*	**0.114**	**0.103**	*0.061*	0.017	0.009	0.001	0.016	0.004	*0.061*	0.050	0.050		
q5 Enjoyment	coef.	**0.438**	**0.391**	0.154	0.048		**0.339**	*0.249*	**0.365**	**0.408**	*0.292*	*0.283*	*0.226*	*0.213*	*0.298*	*0.214*	**0.344**	*0.298*	**0.310**	**0.301**	*0.218*	**0.329**	*0.236*	**0.317**	*0.233*	*0.256*	**0.317**	**0.312**	7.187	3
	l_95	0.371	0.327	0.076	-0.042		0.267	0.182	0.295	0.337	0.210	0.207	0.155	0.134	0.220	0.139	0.277	0.226	0.240	0.242	0.155	0.250	0.164	0.244	0.167	0.185	0.242	0.234		
	u_95	0.506	0.455	0.232	0.137		0.410	0.316	0.434	0.479	0.374	0.360	0.297	0.293	0.375	0.288	0.412	0.369	0.380	0.360	0.280	0.409	0.308	0.390	0.299	0.326	0.392	0.390		
	t	**12.81**	**11.93**	3.89	1.04		**9.29**	**7.30**	**10.26**	**11.33**	**7.01**	**7.26**	**6.27**	**5.25**	**7.53**	**5.63**	**10.03**	**8.20**	**8.69**	**10.02**	**6.87**	**8.15**	**6.45**	**8.53**	**6.94**	**7.13**	**8.27**	**7.87**		
	R^2	**0.163**	**0.145**	0.018	0.001		*0.094*	*0.060*	**0.111**	**0.133**	*0.055*	*0.060*	0.045	0.032	*0.063*	0.037	**0.107**	*0.074*	*0.083*	**0.107**	*0.053*	*0.089*	0.047	*0.080*	*0.054*	*0.057*	*0.075*	*0.069*		
q6 Life meaning	coef.	0.197	0.062	-0.051	0.037	*0.277*		*0.227*	*0.256*	*0.272*	0.110	**0.350**	**0.328**	*0.295*	0.149	0.132	*0.217*	0.089	0.101	*0.290*	0.148	*0.205*	0.192	0.095	0.031	0.116	*0.230*	**0.331**	3.962	24
	l_95	0.132	0.000	-0.122	-0.045	0.218		0.167	0.192	0.205	0.034	0.283	0.266	0.225	0.077	0.064	0.154	0.022	0.035	0.237	0.091	0.131	0.127	0.027	-0.031	0.051	0.160	0.261		
	u_95	0.262	0.125	0.020	0.118	0.335		0.288	0.321	0.338	0.186	0.417	0.389	0.366	0.221	0.200	0.280	0.156	0.167	0.343	0.205	0.279	0.258	0.164	0.092	0.182	0.299	0.400		
	t	**5.92**	1.95	-1.42	0.89	**9.29**		**7.40**	**7.77**	**8.02**	2.85	**10.24**	**10.40**	**8.21**	*4.08*	3.80	**6.75**	2.60	3.01	**10.78**	**5.09**	**5.42**	**5.75**	2.73	0.99	3.49	**6.51**	**9.35**		
	R^2	0.040	0.005	0.002	0.001	*0.094*		*0.062*	*0.067*	*0.072*	0.010	**0.113**	**0.115**	*0.075*	0.020	0.017	*0.052*	0.008	0.011	**0.122**	0.030	0.041	0.038	0.009	0.001	0.014	0.048	*0.095*		
q7 Concentration	coef.	*0.214*	0.194	0.137	0.186	*0.240*	*0.271*		**0.400**	**0.360**	**0.453**	*0.282*	0.018	0.151	**0.371**	0.170	*0.242*	**0.337**	*0.297*	*0.216*	*0.203*	*0.292*	0.106	*0.255*	0.176	*0.240*	0.177	*0.225*	5.802	16
	l_95	0.143	0.126	0.060	0.098	0.176	0.199		0.333	0.289	0.375	0.206	-0.054	0.072	0.296	0.096	0.174	0.268	0.228	0.156	0.141	0.211	0.034	0.182	0.111	0.171	0.101	0.147		
	u_95	0.285	0.261	0.213	0.274	0.305	0.343		0.468	0.431	0.530	0.358	0.090	0.231	0.446	0.244	0.311	0.406	0.367	0.275	0.264	0.373	0.179	0.328	0.242	0.310	0.253	0.303		
	t	**5.92**	**5.65**	3.51	*4.16*	**7.30**	**7.40**		**11.62**	**9.98**	**11.49**	**7.30**	0.49	3.74	**9.72**	*4.50*	**6.97**	**9.54**	**8.45**	**7.06**	**6.47**	**7.09**	2.88	**6.86**	**5.26**	**6.77**	*4.55*	**5.65**		
	R^2	0.040	0.037	0.015	0.020	*0.060*	*0.062*		**0.139**	**0.106**	**0.136**	*0.060*	0.000	0.016	**0.101**	0.024	*0.055*	*0.098*	*0.079*	*0.056*	0.048	*0.069*	0.010	*0.053*	0.032	*0.052*	0.024	0.037		
q8 Security	coef.	*0.287*	*0.214*	0.101	*0.202*	**0.306**	*0.263*	**0.347**		**0.432**	**0.353**	*0.299*	*0.207*	*0.202*	**0.314**	*0.224*	**0.335**	**0.327**	*0.260*	*0.265*	0.190	*0.203*	0.183	*0.220*	0.191	*0.271*	*0.221*	*0.257*	6.572	8
	l_95	0.223	0.152	0.029	0.121	0.247	0.196	0.288		0.368	0.280	0.230	0.142	0.130	0.243	0.156	0.273	0.263	0.196	0.210	0.133	0.129	0.117	0.153	0.130	0.207	0.151	0.185		
	u_95	0.351	0.276	0.172	0.283	0.364	0.329	0.405		0.495	0.426	0.369	0.271	0.275	0.384	0.292	0.396	0.391	0.325	0.319	0.247	0.278	0.249	0.288	0.251	0.335	0.291	0.329		
	t	**8.77**	**6.79**	2.77	**4.90**	**10.26**	**7.77**	**11.62**		**13.43**	**9.47**	**8.47**	**6.27**	**5.46**	**8.78**	**6.49**	**10.74**	**10.02**	**7.92**	**9.59**	**6.54**	**5.37**	**5.42**	**6.37**	**6.18**	**8.34**	**6.19**	**7.03**		
	R^2	*0.084*	*0.052*	0.009	0.028	**0.111**	*0.067*	**0.139**		**0.177**	*0.097*	*0.079*	0.045	0.034	*0.084*	0.048	**0.121**	**0.107**	*0.070*	*0.099*	0.049	0.041	0.034	0.046	0.044	*0.077*	0.044	*0.056*		
q9 Envir. healthy	coef.	**0.302**	*0.208*	0.090	*0.229*	**0.325**	*0.264*	*0.295*	**0.410**		**0.324**	*0.293*	*0.270*	*0.254*	*0.290*	*0.235*	*0.293*	*0.209*	0.160	*0.245*	*0.233*	*0.204*	0.173	**0.370**	0.194	*0.241*	*0.268*	**0.334**	6.623	7
	l_95	0.240	0.147	0.020	0.151	0.269	0.199	0.237	0.350		0.252	0.226	0.208	0.183	0.222	0.169	0.233	0.144	0.095	0.192	0.178	0.131	0.109	0.307	0.135	0.178	0.201	0.265		
	u_95	0.365	0.268	0.160	0.308	0.382	0.328	0.353	0.470		0.396	0.361	0.332	0.324	0.359	0.302	0.354	0.274	0.224	0.298	0.288	0.277	0.238	0.433	0.253	0.303	0.336	0.402		
	t	**9.54**	**6.74**	2.54	**5.73**	**11.33**	**8.02**	**9.98**	**13.43**		**8.87**	**8.53**	**8.54**	**7.09**	**8.29**	**6.99**	**9.51**	**6.35**	*4.86*	**9.04**	**8.33**	**5.49**	**5.26**	**11.52**	**6.45**	**7.55**	**7.81**	**9.59**		
	R^2	*0.098*	*0.051*	0.008	0.038	**0.133**	*0.072*	**0.106**	**0.177**		*0.086*	*0.081*	*0.080*	*0.056*	*0.076*	*0.055*	*0.097*	0.046	0.028	*0.089*	*0.076*	0.042	0.032	**0.137**	0.047	*0.064*	*0.068*	*0.099*		
q10 Energy	coef.	*0.217*	**0.338**	**0.301**	**0.348**	0.190	0.087	**0.301**	*0.274*	*0.265*		**0.364**	0.018	0.092	*0.242*	*0.284*	*0.220*	**0.446**	**0.446**	*0.226*	0.106	*0.200*	0.074	*0.244*	*0.204*	*0.224*	0.134	*0.206*	5.779	17
	l_95	0.160	0.286	0.241	0.280	0.137	0.027	0.250	0.217	0.206		0.305	-0.040	0.027	0.180	0.226	0.164	0.395	0.395	0.179	0.055	0.134	0.015	0.185	0.151	0.167	0.071	0.142		
	u_95	0.275	0.389	0.361	0.417	0.243	0.148	0.353	0.331	0.324		0.422	0.076	0.157	0.305	0.343	0.276	0.498	0.496	0.274	0.157	0.267	0.133	0.303	0.257	0.280	0.196	0.269		
	t	**7.43**	**12.94**	**9.90**	**9.98**	**7.01**	2.85	**11.49**	**9.47**	**8.87**		**12.17**	0.60	2.79	**7.61**	**9.59**	**7.77**	**17.02**	**17.25**	**9.29**	*4.09*	**5.94**	2.45	**8.10**	**7.58**	**7.76**	*4.20*	**6.35**		
	R^2	*0.062*	**0.166**	**0.105**	**0.106**	*0.055*	0.010	**0.136**	*0.097*	*0.086*		**0.152**	0.000	0.009	*0.065*	*0.100*	*0.067*	**0.257**	**0.262**	*0.094*	0.020	0.049	0.007	*0.073*	*0.064*	*0.067*	0.021	0.046		

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q11 Appear-ance	coef.	0.214	0.166	0.059	0.217	0.211	**0.322**	0.214	0.265	0.274	**0.417**		**0.367**	0.242	0.238	0.258	0.235	0.235	0.232	**0.352**	0.205	0.201	0.210	0.132	0.121	0.269	0.287	**0.439**	6.192	14
	l_95	0.152	0.106	-0.008	0.141	0.154	0.260	0.157	0.204	0.211	0.350		0.310	0.174	0.171	0.195	0.175	0.173	0.171	0.304	0.152	0.132	0.148	0.066	0.063	0.209	0.222	0.376		
	u_95	0.276	0.225	0.127	0.293	0.267	0.384	0.272	0.326	0.338	0.484		0.425	0.310	0.306	0.321	0.294	0.297	0.293	0.401	0.259	0.270	0.272	0.197	0.179	0.329	0.351	0.503		
	t	**6.78**	**5.50**	1.73	**5.59**	**7.26**	**10.24**	**7.30**	**8.47**	**8.53**	**12.17**		**12.62**	**6.97**	**6.92**	**8.01**	**7.70**	**7.44**	**7.44**	**14.29**	**7.52**	**5.69**	**6.64**	3.97	4.09	**8.81**	**8.67**	**13.65**		
	R^2	0.052	0.035	0.004	0.036	0.060	**0.113**	0.060	0.079	0.081	**0.152**		**0.161**	0.055	0.055	0.072	0.067	0.063	0.063	**0.197**	0.064	0.046	0.050	0.019	0.020	0.085	0.083	**0.183**		
q12 Money	coef.	0.247	0.051	-0.072	0.198	0.198	**0.350**	0.016	0.216	0.296	0.024	**0.437**		**0.489**	0.238	**0.316**	0.217	0.077	0.083	0.299	0.153	0.157	**0.318**	0.100	0.088	0.245	**0.406**	**0.576**	5.200	21
	l_95	0.181	-0.014	-0.145	0.115	0.136	0.284	-0.048	0.148	0.228	-0.054	0.369		0.421	0.164	0.249	0.152	0.008	0.015	0.244	0.095	0.076	0.253	0.029	0.025	0.179	0.339	0.511		
	u_95	0.314	0.116	0.001	0.281	0.259	0.416	0.080	0.283	0.364	0.103	0.505		0.557	0.311	0.384	0.282	0.146	0.151	0.354	0.212	0.237	0.384	0.171	0.151	0.311	0.474	0.641		
	t	**7.30**	1.55	-1.93	4.70	**6.27**	**10.40**	0.49	**6.27**	**8.54**	0.60	**12.62**		**14.09**	**6.38**	**9.21**	**6.54**	2.19	2.39	**10.74**	**5.12**	3.81	**9.54**	2.77	2.75	**7.30**	**11.78**	**17.51**		
	R^2	0.060	0.003	0.004	0.026	0.045	**0.115**	0.000	0.045	0.080	0.000	**0.161**		**0.191**	0.046	0.092	0.048	0.006	0.007	**0.121**	0.030	0.021	0.098	0.009	0.009	0.060	**0.142**	**0.267**		
q13 Informa-tion	coef.	0.115	0.079	-0.024	0.000	0.149	0.253	0.108	0.169	0.222	0.100	0.228	**0.391**		**0.377**	0.194	0.126	0.083	0.108	0.169	0.112	0.111	0.223	0.155	0.211	0.177	0.193	0.272	3.620	25
	l_95	0.054	0.021	-0.089	-0.075	0.093	0.192	0.051	0.108	0.161	0.029	0.164	0.336		0.315	0.132	0.067	0.021	0.048	0.119	0.059	0.042	0.163	0.092	0.156	0.118	0.129	0.207		
	u_95	0.175	0.137	0.041	0.075	0.205	0.313	0.165	0.230	0.284	0.170	0.293	0.445		0.438	0.256	0.185	0.144	0.169	0.220	0.165	0.180	0.283	0.217	0.266	0.237	0.257	0.336		
	t	3.70	2.68	-0.72	-0.01	**5.25**	**8.21**	3.74	**5.46**	**7.09**	2.79	**6.97**	**14.09**		**11.94**	**6.13**	4.20	2.63	3.51	**6.54**	4.16	3.17	**7.33**	4.84	**7.56**	**5.84**	**5.93**	**8.21**		
	R^2	0.016	0.009	0.001	0.000	0.032	0.075	0.016	0.034	0.056	0.009	0.055	**0.191**		**0.145**	0.043	0.021	0.008	0.014	0.049	0.020	0.015	0.060	0.027	0.064	0.039	0.040	0.074		
q14 Leisure	coef.	0.234	0.174	0.111	0.128	0.213	0.131	0.273	0.268	0.261	0.267	0.229	0.194	**0.385**		0.287	0.267	0.244	0.242	0.212	0.180	0.191	0.207	0.228	0.189	0.232	0.257	**0.304**	5.669	18
	l_95	0.174	0.117	0.045	0.052	0.157	0.068	0.218	0.208	0.199	0.198	0.164	0.134	0.322		0.226	0.209	0.184	0.183	0.161	0.127	0.121	0.146	0.165	0.133	0.173	0.193	0.239		
	u_95	0.294	0.232	0.176	0.203	0.268	0.194	0.328	0.328	0.322	0.336	0.294	0.254	0.449		0.348	0.324	0.304	0.302	0.263	0.233	0.261	0.267	0.290	0.245	0.291	0.321	0.369		
	t	**7.67**	**5.94**	3.31	3.32	**7.53**	4.08	**9.72**	**8.78**	**8.29**	**7.61**	**6.92**	**6.38**	**11.94**		**9.20**	**9.10**	**7.94**	**7.99**	**8.19**	**6.71**	**5.37**	**6.68**	**7.18**	**6.64**	**7.68**	**7.91**	**9.18**		
	R^2	0.065	0.040	0.013	0.013	0.063	0.020	**0.101**	0.084	0.076	0.065	0.055	0.046	**0.145**		0.092	0.090	0.070	0.071	0.074	0.051	0.040	0.051	0.058	0.050	0.066	0.069	0.091		
q15 Mobility	coef.	0.261	0.165	0.193	**0.333**	0.172	0.130	0.140	0.215	0.235	**0.351**	0.280	0.292	0.223	**0.322**		**0.353**	**0.341**	**0.335**	0.299	0.142	0.224	0.186	0.212	0.136	**0.387**	0.299	**0.384**	6.478	10
	l_95	0.197	0.103	0.124	0.256	0.112	0.063	0.079	0.150	0.169	0.279	0.211	0.230	0.152	0.253		0.294	0.279	0.273	0.246	0.085	0.149	0.121	0.145	0.076	0.327	0.231	0.316		
	u_95	0.325	0.227	0.262	0.411	0.231	0.197	0.201	0.280	0.301	0.422	0.349	0.354	0.294	0.390		0.413	0.404	0.396	0.351	0.199	0.298	0.251	0.279	0.197	0.447	0.366	0.451		
	t	**8.04**	**5.26**	**5.50**	**8.44**	**5.63**	3.80	4.50	**6.49**	**6.99**	**9.59**	**8.01**	**9.21**	**6.13**	**9.20**		**11.62**	**10.71**	**10.63**	**11.19**	**4.91**	**5.89**	**5.61**	**6.22**	4.43	**12.71**	**8.68**	**11.10**		
	R^2	0.072	0.032	0.035	0.079	0.037	0.017	0.024	0.048	0.055	0.100	0.072	0.092	0.043	0.092		**0.140**	**0.121**	**0.120**	**0.131**	0.028	0.049	0.036	0.044	0.023	**0.163**	0.083	**0.129**		
q16 Sleep	coef.	**0.372**	0.294	0.181	0.291	**0.311**	0.239	0.226	**0.361**	**0.332**	**0.305**	0.284	0.223	0.163	**0.337**	**0.395**		**0.439**	**0.392**	**0.361**	0.262	**0.396**	0.249	**0.304**	0.226	**0.334**	**0.413**	**0.314**	8.003	2
	l_95	0.306	0.231	0.108	0.208	0.250	0.169	0.162	0.295	0.263	0.228	0.212	0.156	0.087	0.264	0.328		0.375	0.328	0.307	0.204	0.323	0.181	0.235	0.164	0.269	0.344	0.241		
	u_95	0.437	0.356	0.254	0.374	0.372	0.308	0.290	0.426	0.400	0.383	0.356	0.291	0.239	0.409	0.462		0.503	0.456	0.415	0.320	0.469	0.317	0.373	0.289	0.399	0.482	0.388		
	t	**11.22**	**9.15**	4.84	**6.89**	**10.03**	**6.75**	**6.97**	**10.74**	**9.51**	**7.77**	**7.70**	**6.54**	4.20	**9.10**	**11.62**		**13.54**	**12.01**	**13.14**	**8.88**	**10.69**	**7.21**	**8.62**	**7.10**	**10.09**	**11.80**	**8.38**		
	R^2	**0.130**	0.091	0.027	0.054	**0.107**	0.052	0.055	**0.121**	0.097	0.067	0.067	0.048	0.021	0.090	**0.140**		**0.179**	**0.147**	**0.171**	0.086	**0.143**	0.058	0.081	0.057	**0.108**	**0.142**	0.077		
q17 Daily activities	coef.	0.235	0.266	**0.351**	**0.409**	0.250	0.091	0.291	**0.327**	0.220	**0.576**	0.266	0.074	0.099	0.287	**0.355**	**0.408**		**0.772**	0.294	0.203	0.274	0.121	0.277	0.217	0.289	0.207	0.247	7.020	4
	l_95	0.170	0.205	0.284	0.332	0.190	0.022	0.231	0.263	0.152	0.509	0.196	0.008	0.025	0.216	0.290	0.349		0.730	0.240	0.146	0.197	0.054	0.210	0.156	0.226	0.137	0.175		
	u_95	0.301	0.327	0.419	0.486	0.309	0.159	0.351	0.391	0.288	0.642	0.336	0.140	0.173	0.358	0.420	0.468		0.813	0.347	0.260	0.351	0.188	0.344	0.277	0.353	0.277	0.319		
	t	**7.08**	**8.53**	**10.21**	**10.38**	**8.20**	2.60	**9.54**	**10.02**	**6.35**	**17.02**	**7.44**	2.19	2.63	**7.94**	**10.71**	**13.54**		**36.29**	**10.77**	**7.00**	**6.95**	3.54	**8.10**	**7.05**	**8.94**	**5.78**	**6.73**		
	R^2	0.056	0.080	**0.111**	**0.114**	0.074	0.008	0.098	**0.107**	0.046	**0.257**	0.063	0.006	0.008	0.070	**0.121**	**0.179**		**0.611**	**0.122**	0.055	0.066	0.015	0.073	0.056	0.087	0.038	0.051		
q18 Work capacity	coef.	0.227	0.270	**0.333**	**0.394**	0.267	0.106	0.265	0.267	0.172	**0.589**	0.270	0.081	0.133	0.292	**0.358**	**0.375**	**0.792**		**0.320**	0.199	0.282	0.125	0.267	0.201	0.264	0.226	0.217	6.846	5
	l_95	0.161	0.208	0.264	0.315	0.206	0.037	0.203	0.201	0.103	0.522	0.198	0.014	0.059	0.220	0.292	0.313	0.749		0.267	0.142	0.203	0.058	0.199	0.139	0.200	0.155	0.144		
	u_95	0.293	0.331	0.402	0.473	0.327	0.176	0.326	0.333	0.242	0.656	0.341	0.149	0.208	0.364	0.424	0.436	0.835		0.374	0.257	0.360	0.193	0.336	0.262	0.329	0.297	0.291		
	t	**6.73**	**8.54**	**9.48**	**9.82**	**8.69**	3.01	**8.45**	**7.92**	4.86	**17.25**	**7.44**	2.39	3.51	**7.99**	**10.63**	**12.01**	**36.29**		**11.72**	**6.77**	**7.03**	3.63	**7.70**	**6.40**	**8.00**	**6.26**	**5.81**		
	R^2	0.051	0.080	0.097	**0.103**	0.083	0.011	0.079	0.070	0.028	**0.262**	0.063	0.007	0.014	0.071	**0.120**	**0.147**	**0.611**		**0.141**	0.052	0.067	0.015	0.066	0.047	0.071	0.045	0.039		
q19 Self satisfac-tion	coef.	**0.339**	0.259	0.105	**0.355**	**0.355**	**0.422**	0.261	**0.373**	**0.363**	**0.413**	**0.560**	**0.404**	0.287	**0.350**	**0.438**	**0.473**	**0.415**	**0.440**		**0.346**	**0.378**	**0.331**	**0.302**	0.221	**0.361**	**0.414**	**0.477**	9.339	1
	l_95	0.262	0.186	0.020	0.260	0.286	0.345	0.189	0.297	0.284	0.326	0.483	0.330	0.201	0.266	0.361	0.402	0.339	0.366		0.281	0.291	0.254	0.222	0.149	0.286	0.333	0.396		
	u_95	0.415	0.333	0.190	0.450	0.425	0.498	0.334	0.450	0.442	0.501	0.637	0.478	0.372	0.434	0.515	0.544	0.490	0.514		0.412	0.465	0.408	0.382	0.293	0.436	0.494	0.559		
	t	**8.70**	**6.91**	2.42	**7.36**	**10.02**	**10.78**	**7.06**	**9.59**	**9.04**	**9.29**	**14.29**	**10.74**	**6.54**	**8.19**	**11.19**	**13.14**	**10.77**	**11.72**		**10.38**	**8.54**	**8.42**	**7.40**	**6.02**	**9.44**	**10.10**	**11.48**		
	R^2	0.083	0.054	0.007	0.061	**0.107**	**0.122**	0.056	0.099	0.089	0.094	**0.197**	**0.121**	0.049	0.074	**0.131**	**0.171**	**0.122**	**0.141**		**0.114**	0.096	0.078	0.061	0.041	0.096	**0.108**	**0.136**		
q20 Relation-ships	coef.	0.238	0.178	0.058	0.182	0.244	0.204	0.235	0.255	**0.328**	0.184	**0.311**	0.198	0.180	0.283	0.198	**0.327**	0.272	0.260	**0.329**		0.257	**0.406**	**0.360**	0.242	**0.310**	0.289	0.261	6.349	11
	l_95	0.162	0.105	-0.025	0.088	0.175	0.126	0.164	0.179	0.251	0.096	0.230	0.122	0.095	0.200	0.119	0.255	0.196	0.185	0.267		0.171	0.332	0.283	0.172	0.236	0.209	0.177		
	u_95	0.314	0.251	0.141	0.276	0.314	0.283	0.307	0.332	0.405	0.272	0.392	0.273	0.265	0.366	0.278	0.399	0.348	0.336	0.391		0.343	0.479	0.437	0.312	0.384	0.370	0.344		
	t	**6.12**	4.81	1.37	3.79	**6.87**	**5.09**	**6.47**	**6.54**	**8.33**	4.09	**7.52**	**5.12**	4.16	**6.71**	**4.91**	**8.88**	**7.00**	**6.77**	**10.38**		**5.88**	**10.88**	**9.20**	**6.78**	**8.23**	**7.05**	**6.11**		
	R^2	0.043	0.027	0.002	0.017	0.053	0.030	0.048	0.049	0.076	0.020	0.064	0.030	0.020	0.051	0.028	0.086	0.055	0.052	**0.114**		0.048	**0.124**	0.092	0.052	0.075	0.056	0.043		

		q1 overall QoL	**q2** Health	**q3** Pain	**q4** Medicine	**q5** Enjoyment	**q6** Life meaning	**q7** Concentration	**q8** Security	**q9** Envir. healthy	**q10** Energy	**q11** Appearance	**q12** Money	**q13** Information	**q14** Leisure	**q15** Mobility	**q16** Sleep	**q17** Daily activities	**q18** Work capacity	**q19** Self satisfaction	**q20** Relationships	**q21** Sex life	**q22** Support	**q23** Living conditions	**q24** Health serv. access	**q25** Transport	**q26** Depression	**q27** Food enough	**Sum of significant correlations**	Rank of sum of significant correlations
q21 Sex life	coef.	0.198	*0.204*	0.127	0.110	*0.269*	*0.202*	*0.235*	0.199	*0.207*	*0.245*	*0.227*	0.132	0.130	*0.211*	*0.217*	**0.361**	*0.241*	*0.239*	*0.255*	0.186		**0.325**	**0.313**	*0.215*	*0.221*	**0.349**	*0.216*	5.337	20
	l_95	0.125	0.136	0.052	0.021	0.204	0.129	0.170	0.126	0.133	0.164	0.148	0.064	0.049	0.134	0.145	0.295	0.173	0.173	0.196	0.124		0.255	0.243	0.149	0.150	0.276	0.137		
	u_95	0.270	0.273	0.203	0.199	0.334	0.275	0.300	0.272	0.281	0.326	0.305	0.201	0.210	0.289	0.289	0.427	0.309	0.306	0.314	0.249		0.395	0.384	0.282	0.292	0.422	0.295		
	t	**5.37**	**5.87**	3.30	2.43	**8.15**	**5.42**	**7.09**	**5.37**	**5.49**	**5.94**	**5.69**	3.81	3.17	**5.37**	**5.89**	**10.69**	**6.95**	**7.03**	**8.54**	**5.88**		**9.09**	**8.70**	**6.34**	**6.13**	**9.43**	**5.39**		
	R^2	0.040	0.048	0.016	0.009	*0.089*	0.041	*0.069*	0.041	0.042	0.049	0.046	0.021	0.015	0.040	0.049	**0.143**	*0.066*	*0.067*	*0.096*	0.048		**0.108**	*0.100*	*0.055*	*0.052*	**0.115**	0.041		
q22 Support	coef.	*0.221*	0.152	-0.037	0.027	0.199	0.198	0.092	0.185	0.184	0.096	*0.240*	**0.307**	*0.269*	*0.244*	0.196	*0.233*	0.122	0.123	*0.236*	**0.305**	**0.331**		**0.313**	*0.256*	*0.288*	**0.374**	**0.305**	5.034	23
	l_95	0.155	0.089	-0.109	-0.055	0.139	0.131	0.030	0.118	0.115	0.019	0.169	0.244	0.197	0.172	0.127	0.170	0.054	0.056	0.181	0.250	0.260		0.246	0.196	0.224	0.306	0.234		
	u_95	0.287	0.215	0.035	0.110	0.260	0.266	0.155	0.251	0.252	0.173	0.310	0.370	0.341	0.316	0.264	0.297	0.189	0.190	0.291	0.360	0.403		0.379	0.316	0.351	0.441	0.376		
	t	**6.59**	*4.73*	-1.01	0.65	**6.45**	**5.75**	2.88	**5.42**	**5.26**	2.45	**6.64**	**9.54**	**7.33**	**6.68**	**5.61**	**7.21**	3.54	3.63	**8.42**	**10.88**	**9.09**		**9.23**	**8.41**	**8.86**	**10.91**	**8.41**		
	R^2	0.049	0.026	0.001	0.001	0.047	0.038	0.010	0.034	0.032	0.007	*0.050*	*0.098*	*0.060*	*0.051*	0.036	*0.058*	0.015	0.015	*0.078*	**0.124**	**0.108**		*0.092*	*0.078*	*0.086*	**0.124**	*0.078*		
q23 Living conditions	coef.	*0.260*	*0.254*	0.110	0.149	*0.252*	0.093	*0.209*	*0.209*	**0.369**	*0.298*	0.142	0.091	0.176	*0.254*	*0.209*	*0.267*	*0.262*	*0.247*	*0.203*	*0.255*	**0.318**	*0.294*		**0.307**	**0.308**	*0.250*	*0.271*	5.473	19
	l_95	0.197	0.194	0.040	0.070	0.194	0.026	0.149	0.145	0.306	0.226	0.072	0.027	0.105	0.185	0.143	0.207	0.199	0.184	0.149	0.200	0.246	0.232		0.250	0.246	0.183	0.202		
	u_95	0.323	0.313	0.179	0.228	0.310	0.160	0.268	0.274	0.432	0.370	0.212	0.155	0.247	0.324	0.276	0.328	0.326	0.310	0.257	0.309	0.390	0.357		0.363	0.369	0.318	0.341		
	t	**8.12**	**8.37**	3.10	3.69	**8.53**	2.73	**6.86**	**6.37**	**11.52**	**8.10**	3.97	2.77	*4.84*	**7.18**	**6.22**	**8.62**	**8.10**	**7.70**	**7.40**	**9.20**	**8.70**	**9.23**		**10.64**	**9.86**	**7.29**	**7.66**		
	R^2	*0.073*	*0.077*	0.011	0.016	*0.080*	0.009	*0.053*	0.046	**0.137**	*0.073*	0.019	0.009	0.027	*0.058*	0.044	*0.081*	*0.073*	*0.066*	*0.061*	*0.092*	*0.100*	*0.092*		**0.119**	**0.104**	*0.060*	*0.065*		
q24 Health serv.	coef.	*0.217*	*0.201*	0.106	0.082	*0.232*	0.038	0.182	*0.228*	*0.243*	**0.315**	0.163	0.101	**0.302**	*0.264*	0.169	*0.250*	*0.258*	*0.232*	0.187	*0.215*	*0.257*	**0.304**	**0.387**		**0.333**	*0.201*	0.111	5.141	22
	l_95	0.145	0.133	0.028	-0.007	0.167	-0.037	0.114	0.156	0.169	0.233	0.085	0.029	0.223	0.186	0.094	0.181	0.186	0.161	0.126	0.153	0.178	0.233	0.316		0.264	0.124	0.031		
	u_95	0.289	0.269	0.184	0.172	0.298	0.112	0.249	0.300	0.318	0.396	0.241	0.173	0.380	0.342	0.244	0.319	0.330	0.304	0.248	0.277	0.337	0.374	0.459		0.402	0.278	0.191		
	t	**5.94**	**5.79**	2.67	1.80	**6.94**	0.99	**5.26**	**6.18**	**6.45**	**7.58**	*4.09*	2.75	**7.56**	**6.64**	*4.43*	**7.10**	**7.05**	**6.40**	**6.02**	**6.78**	**6.34**	**8.41**	**10.64**		**9.49**	**5.13**	2.71		
	R^2	0.040	0.038	0.008	0.004	*0.054*	0.001	0.032	0.044	0.047	*0.064*	0.020	0.009	*0.064*	0.050	0.023	*0.057*	*0.056*	0.047	0.041	*0.052*	*0.055*	*0.078*	**0.119**		*0.097*	0.030	0.009		
q25 Transport	coef.	*0.282*	0.168	0.117	**0.306**	*0.223*	0.124	*0.216*	*0.282*	*0.264*	*0.300*	**0.317**	*0.244*	*0.221*	*0.283*	**0.420**	**0.323**	**0.300**	*0.268*	*0.266*	*0.241*	*0.235*	*0.297*	**0.338**	*0.291*		**0.309**	**0.346**	6.739	6
	l_95	0.216	0.104	0.045	0.225	0.162	0.054	0.153	0.216	0.195	0.224	0.247	0.178	0.146	0.211	0.355	0.260	0.234	0.202	0.211	0.183	0.160	0.231	0.271	0.231		0.239	0.275		
	u_95	0.347	0.232	0.190	0.387	0.285	0.193	0.279	0.348	0.333	0.376	0.388	0.309	0.295	0.355	0.485	0.386	0.366	0.334	0.321	0.298	0.310	0.363	0.405	0.351		0.379	0.418		
	t	**8.41**	**5.15**	3.18	**7.40**	**7.13**	3.49	**6.77**	**8.34**	**7.55**	**7.76**	**8.81**	**7.30**	**5.84**	**7.68**	**12.71**	**10.09**	**8.94**	**8.00**	**9.44**	**8.23**	**6.13**	**8.86**	**9.86**	**9.49**		**8.66**	**9.50**		
	R^2	*0.078*	0.031	0.012	*0.061*	*0.057*	0.014	*0.052*	*0.077*	*0.064*	*0.067*	*0.085*	*0.060*	0.039	*0.066*	**0.163**	**0.108**	*0.087*	*0.071*	*0.096*	*0.075*	*0.052*	*0.086*	**0.104**	*0.097*		*0.082*	*0.097*		
q26 Depress-ion	coef.	*0.279*	*0.211*	0.134	*0.255*	*0.237*	*0.210*	0.136	0.198	*0.252*	0.154	*0.289*	**0.349**	*0.207*	*0.270*	*0.278*	**0.344**	0.185	0.197	*0.262*	0.193	**0.329**	**0.332**	*0.238*	0.151	*0.265*		**0.412**	6.234	13
	l_95	0.218	0.152	0.066	0.180	0.181	0.147	0.078	0.135	0.189	0.082	0.224	0.290	0.139	0.203	0.215	0.286	0.122	0.135	0.211	0.139	0.261	0.272	0.174	0.093	0.205		0.348		
	u_95	0.339	0.269	0.201	0.331	0.294	0.273	0.195	0.260	0.316	0.226	0.355	0.407	0.276	0.337	0.341	0.401	0.248	0.259	0.313	0.247	0.398	0.392	0.302	0.209	0.326		0.476		
	t	**9.01**	**7.07**	3.90	**6.62**	**8.27**	**6.51**	*4.55*	**6.19**	**7.81**	*4.20*	**8.67**	**11.78**	**5.93**	**7.91**	**8.68**	**11.80**	**5.78**	**6.26**	**10.10**	**7.05**	**9.43**	**10.91**	**7.29**	**5.13**	**8.66**		**12.62**		
	R^2	*0.088*	*0.056*	0.018	0.050	*0.075*	0.048	0.024	0.044	*0.068*	0.021	*0.083*	**0.142**	0.040	*0.069*	*0.083*	**0.142**	0.038	0.045	**0.108**	*0.056*	**0.115**	**0.124**	*0.060*	0.030	*0.082*		**0.159**		
q27 Food enough	coef.	**0.305**	0.119	0.033	*0.249*	*0.220*	*0.286*	0.163	*0.216*	*0.296*	*0.223*	**0.417**	**0.464**	*0.274*	*0.300*	**0.336**	*0.245*	*0.207*	0.178	*0.284*	0.163	0.188	*0.254*	*0.241*	0.078	*0.280*	**0.386**		6.295	12
	l_95	0.247	0.062	-0.033	0.175	0.165	0.226	0.106	0.156	0.235	0.154	0.357	0.412	0.208	0.236	0.277	0.188	0.147	0.118	0.236	0.111	0.120	0.195	0.179	0.022	0.222	0.326			
	u_95	0.363	0.177	0.098	0.322	0.275	0.346	0.220	0.276	0.356	0.292	0.476	0.516	0.339	0.364	0.396	0.303	0.268	0.238	0.333	0.216	0.257	0.314	0.303	0.135	0.338	0.447			
	t	**10.34**	*4.06*	0.98	**6.66**	**7.87**	**9.35**	**5.65**	**7.03**	**9.59**	**6.35**	**13.65**	**17.51**	**8.21**	**9.18**	**11.10**	**8.38**	**6.73**	**5.81**	**11.48**	**6.11**	**5.39**	**8.41**	**7.66**	2.71	**9.50**	**12.62**			
	R^2	**0.113**	0.019	0.001	0.050	*0.069*	*0.095*	0.037	*0.056*	*0.099*	0.046	**0.183**	**0.267**	*0.074*	*0.091*	**0.129**	*0.077*	*0.051*	0.039	**0.136**	0.043	0.041	*0.078*	*0.065*	0.009	*0.097*	**0.159**			
Total R^2		1.741	1.406	0.770	1.098	1.829	1.149	1.350	1.768	1.912	1.912	1.890	1.677	1.098	1.588	1.746	2.266	1.961	2.437	2.366	1.300	1.436	1.378	1.577	1.092	1.808	1.823	2.083		

coef. = univariate linear regression coefficient; l_95 = lower 95% confidence interval; u_95 = upper 95% confidence interval; t = t statistic

satistical significance:
- **5.83** = associations equivalent to p<0.00001 significant
- **4.92** = associations equivalent to p<0.001 significant
- *4.03* = associations equivalent to p<0.05 significant

all after adjusting for 27*26=702 comparisons (Bonferroni correction)

- **0.400** > 0.4 correlation
- **0.300** 0.4 > 0.3 correlation
- *0.200* 0.3 > 0.2 correlation

- **0.150** > 0.150 R^2
- **0.100** 0.150 > 0.100 R^2
- *0.050* 0.100 > 0.050 R^2

Appendix P

BWS DCE procedure

Instructions for Best-Worst Pilot

Checklist of things to bring:

- Consent forms (Chichewa): 12 (two for each of the six participants)
- Information sheets (Chichewa): 6 (one for each of the six participants)
- Pens: 2 (for completing the consent forms)
- Digital Recorders: Two (one each) – these should be charged the day before.
- Spare batteries for digital recorder – 4 AAA
- All 81 Red, Yellow and Green cards
- Random numbers list.
- Data capture sheets: Six (one for each participant)
- 20 small stones – could also use large beans (maybe this would be better)

Protocol:

One woman at a time should complete the exercise.

1. Introduce yourself and briefly explain the study and read the consent form.

2. If the woman agrees to take part in the exercise read the information sheet to her, then get her to sign two copies of the consent form if she still agrees to take part. Make sure that she is giving her consent for the tape recording too. Give her one copy of the signed consent form to keep; you keep the other copy. Give her the information sheet to keep. Tell the woman that there are no right or wrong answers and that we are not here to judge what they say or how they complete the exercise. We are only interested in their opinions.

3. Select 10 random cards from the 81 using the list of random numbers (one row per participant)

4. Start the recording.

5. Lay out the 10 cards in front of the participant and read each one with the participant. To ensure that they understand each situation get them to explain it to you with an example of what they think that scenario means.

6. Get the participants to choose their best and worst scenarios from the 10. It is important to remind them that it is the scenarios that they think are the best and worst for someone (including them) to have, NOT the scenarios that they are in. The exercise is hypothetical and should relate to how they value each area of quality of life – which areas they think are most important. Tell the participants that they should 'think aloud' i.e. speak what they are thinking when they are making their choices of best and worst scenarios. *Participants should be encouraged to say why they have chosen a particular scenario as best or worst by comparing this scenario to the other scenarios.* Perhaps you should keep your distance during the exercise so that they don't get embarrassed or shy about speaking their opinions aloud. Again remind them that whatever they say is anonymous and confidential and that there are no right or wrong answers, we are just interested in their opinions.

   If there are different colour cards from the same question make sure that the respondent does not indicate that the red is better than yellow or green or that the yellow is better than the red as this is doesn't make sense – explain this to the respondent

7. Take the best and worst cards away and note them down on the data capture sheet. Write the best one in row 1 and the worst one in row 10. Write both the card number and the English description in the columns provided.

8. Ask the participants to choose their best and worst scenarios from the remaining 8 cards.

9. Take the best and worst cards away and note them down on the data capture sheet. Write the best one in row 2 and the worst one in row 9. Write both the card number and the English description in the columns provided.

10. Ask the participants to choose their best and worst scenarios from the remaining 6 cards.

11. Take the best and worst cards away and note them down on the data capture sheet. Write the best one in row 3 and the worst one in row 8. Write both the card number and the English description in the columns provided.

12. Ask the participants to choose their best and worst scenarios from the remaining 4 cards.

13. Take the best and worst cards away and note them down on the data capture sheet. Write the best one in row 4 and the worst one in row 7. Write both the card number and the English description in the columns provided.

14. Ask the participants to choose their best and worst scenarios from the remaining 2 cards.

15. Take the best and worst cards away and note them down on the data capture sheet. Write the best one in row 5 and the worst one in row 6. Write both the card number and the English description in the columns provided. Note down the time it took the woman to complete this half of the exercise on the data capture sheet.

16. Put the same 10 cards back on the table and give the woman the 20 stones/beans. Ask the woman to put a number of stones on each card corresponding to how much they value the scenario described on the card (how much they would like to be in the scenario). The more they value the scenario the more stones they should place on the card. If a woman doesn't like the card she can leave it with no stones on it. Again remind the respondents that they should be 'thinking aloud' while they are doing this, so as to explain to us how they are making their decisions. Remind the woman that she is free to change her mind after putting stones on a card. When she is finished check that she is happy with the choices she has made.

17. After the woman has finished placing all the 20 stones on the cards. Record the number of stones placed on each card on the data capture sheet in the column provided (please ensure you write in the row corresponding to the correct card – you should have already filled the data capture sheet in during the first part of the exercise – see steps 6 – 15 above.). Note down the time it took the woman to complete this half of the exercise on the data capture sheet.

18. Collect the stones and cards and ask the woman if she has any questions regarding the exercise. Try to answer the questions as best as you can with reference to the aim of the study (valuing different states of quality of life).

19. Thank the woman for her time, and move on to the next participant.

Appendix Q

Mathematica code for BWS DCE design specification

```
export = 0;
```

```
Binomial[80, 2]
```

```
3160
```

```
Binomial[80, 6]
```

```
300 500 200
```

```
Binomial[Binomial[80, 6], 180]
```

```
511 756 140 002 734 303 863 544 849 524 830 050 013 961 472 659 313 234 118 901 305 433 989 011 124 475 ↖
 681 269 673 875 797 752 195 204 202 671 326 026 714 344 711 251 936 165 295 017 251 251 082 987 213 980 ↖
 549 896 684 505 584 846 830 648 790 714 908 372 989 179 983 961 569 101 638 137 832 271 501 210 891 310 ↖
 649 770 326 163 462 012 816 423 999 280 003 537 967 028 046 387 482 497 698 485 030 066 711 210 894 529 ↖
 861 324 804 912 278 182 120 217 151 132 662 478 327 177 728 943 999 745 342 642 004 618 315 690 576 239 ↖
 750 494 959 923 650 406 495 584 909 746 038 284 330 729 579 641 377 468 804 020 575 819 725 460 413 985 ↖
 293 774 394 242 146 667 961 376 579 818 144 233 655 606 707 787 128 826 305 119 776 966 370 926 964 468 ↖
 144 533 893 682 889 399 932 681 037 109 098 059 015 244 069 954 698 794 504 546 993 625 468 369 881 461 ↖
 075 359 999 647 318 338 986 332 813 160 694 428 404 951 971 555 215 493 283 144 024 460 223 058 365 717 ↖
 192 174 228 966 800 762 135 332 677 818 850 171 924 763 133 347 973 836 595 811 191 485 695 172 238 617 ↖
 885 612 325 018 938 526 197 407 054 125 810 343 305 788 671 092 079 286 182 551 894 223 117 532 614 699 ↖
 658 006 545 419 185 839 627 332 181 197 992 666 041 851 389 160 305 005 602 824 061 079 095 037 855 769 ↖
 257 783 904 742 769 688 661 766 495 587 048 923 090 175 398 606 421 233 045 498 129 138 374 030 947 929 ↖
 541 007 413 506 300 575 522 032 616 655 894 545 395 627 794 698 119 177 799 490 463 826 232 409 963 670 ↖
 600 982 860 967 263 449 994 271 879 868 156 546 195 514 635 329 001 237 446 329 508 312 466 909 497 640 ↖
 088 513 731 132 073 492 693 507 640
```

```
1. Binomial[Binomial[80, 6], 180]
```

$$5.117561400027343 \times 10^{1196}$$

```
npeople = 180;
ncards = 80;
ncolours = 3;
npicks = 6;
```

```
totpicks = npicks * npeople
```

```
1080
```

```
1. totpicks / ncards
```

```
13.5
```

```
cards = Range[ncards]
```

```
{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21,
 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40,
 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60,
 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80}
```

```
Round[ncards / ncolours]
```

```
27
```

```
red = Table[i * ncolours - 2, {i, Round[ncards / ncolours]}]
```

```
{1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34,
 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70, 73, 76, 79}
```

```
nred = Length[red]
```

```
27
```

```
yellow = Table[i * ncolours - 1, {i, Round[ncards / ncolours]}]
```

```
{2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35,
 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68, 71, 74, 77, 80}
```

```
nyellow = Length[yellow]
```

```
27
```

```
green = Table[i * ncolours, {i, Round[ncards / ncolours]}]
```

```
{3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36,
 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81}
```

```
ngreen = Length[green]
```

```
27
```

```
thirteenhalforig = {};
Do[If[i < 41, AppendTo[thirteenhalforig, Table[i, {13}]],
   AppendTo[thirteenhalforig, Table[i, {14}]]], {i, 80}];
```

```
(*thirteenhalforig=Delete[thirteenhalforig,{76}];*)
```

```
(*thirteenhalforig=Partition[thirteenhalforig,{3}];*)
```

```
thirteenhalforig
```

```
{{1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1}, {2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2},
 {3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3}, {4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4},
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```

```
baskets = Table[(j - 1) * 3 + i, {j, 27}, {i, 3}]
```

```
{{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}, {13, 14, 15}, {16, 17, 18},
 {19, 20, 21}, {22, 23, 24}, {25, 26, 27}, {28, 29, 30}, {31, 32, 33},
 {34, 35, 36}, {37, 38, 39}, {40, 41, 42}, {43, 44, 45}, {46, 47, 48},
 {49, 50, 51}, {52, 53, 54}, {55, 56, 57}, {58, 59, 60}, {61, 62, 63},
 {64, 65, 66}, {67, 68, 69}, {70, 71, 72}, {73, 74, 75}, {76, 77, 78}, {79, 80, 81}}
```

```
baskets = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}, {13, 14, 15},
   {16, 17, 18}, {19, 20, 21}, {22, 23, 24}, {25, 26, 27}, {28, 29, 30},
   {31, 32, 33}, {34, 35, 36}, {37, 38, 39}, {40, 41, 42}, {43, 44, 45},
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```

```
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 {64, 65, 66}, {67, 68, 69}, {70, 71, 72}, {73, 74, 75}, {77, 78}, {79, 80, 76}}
```

```
nbaskets = Length[baskets]
```

```
27
```



```
basketnos = Table[i, {i, nbaskets}]
```

```
{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27}
```

```
picksmax = 0;
uniquepairsmax = 0;
subsskeep = {};
iterations6tot = 0;
iterations180tot = 0;

setpickingmethod = 2;

(*1 = random colours, else by colours*)

(*||Length[Union[Flatten[colourtallys]]]>4*)
```

```
Timing[Do[

  Print[n];
  tallys = {1, 30}; y = 0;
  While[
   Not[Min[tallys] > 12 && Max[tallys] < 15] || Length[Union[Flatten[colourtallys]]] > 4,

   thirteenhalf = thirteenhalforig;
   sets = Table[Null, {npeople}];
   y++; If[IntegerQ[y / 100], Print[y]];
   (*Print[Min[tallys]," ",Max[tallys]];*)

   Do[setpicked = {1, 1, 1, 1, 1, 1};
    basketspicked = {1, 1, 1, 1, 1, 1}; z = 0;
    basketnoweights = Table[
      Length[Flatten[Partition[thirteenhalf, 3, 3, {1, 1}, {}][[i]]]], {i, nbaskets}];
    basketspicked = RandomSample[basketnoweights -> basketnos, npicks];
    If[setpickingmethod == 1, setpicked =
      Table[RandomSample[baskets[[basketspicked[[i]]]], 1][[1]], {i, npicks}],
     setpicked = {baskets[[basketspicked[[1]], 1]], baskets[[basketspicked[[2]], 1]],
       baskets[[basketspicked[[3]], 2]], baskets[[basketspicked[[4]], 2]],
       baskets[[basketspicked[[5]], If[basketspicked[[5]] == 26, 1, 3]]],
       baskets[[basketspicked[[6]], If[basketspicked[[6]] == 26, 2, 3]]]};
    While[z < 1000 && (Or @@ Table[Length[thirteenhalf[[setpicked[[i]]]]] == 0,
         {i, npicks}]),
     basketspicked = RandomSample[basketnoweights -> basketnos, npicks];
     If[setpickingmethod == 1, setpicked =
       Table[RandomSample[baskets[[basketspicked[[i]]]], 1][[1]], {i, npicks}],
      setpicked = {baskets[[basketspicked[[1]], 1]], baskets[[basketspicked[[2]], 1]],
        baskets[[basketspicked[[3]], 2]], baskets[[basketspicked[[4]], 2]],
        baskets[[basketspicked[[5]], If[basketspicked[[5]] == 26, 2, 3]]],
        baskets[[basketspicked[[6]], If[basketspicked[[6]] == 26, 2, 3]]]}];
     z++]; iterations6tot += z;
    (*del=Table[{setpicked[[i]],1},{i,npicks}];
    thirteenhalf=Delete[thirteenhalf,del];*)
    Do[If[Length[thirteenhalf[[setpicked[[i]]]]] > 0,
       thirteenhalf = Delete[thirteenhalf, {setpicked[[i]], 1}]];, {i, npicks}];
    sets[[p]] = setpicked;
    (*Print[p," ",setpicked," ",del," ",
     basketnoweights," ",Length[Union[Flatten[thirteenhalf]]]*),
    {p, npeople}]; (*Print[z];*)

   colourtallys = Table[{Length[Intersection[sets[[i]], red]],
      Length[Intersection[sets[[i]], yellow]],
      Length[Intersection[sets[[i]], green]]}, {i, npeople}];

   tallys = Tally[Flatten[sets]][[All, 2]];];

  iterations180tot += y;

  subss = Table[Subsets[sets[[i]], {2}], {i, npeople}];
  uniquepairs = Length[Union[Sequence @@ subss]];
  If[uniquepairs > uniquepairsmax,
   uniquepairsmax = uniquepairs;
   setskeep = sets;
   subsskeep = subss;
   tallyskeep = Tally[Flatten[setskeep]][[All, 2]];
   Print[uniquepairs, " ", Min[tallyskeep], " ",
    Max[tallyskeep], " ", n]],
  {n, 100}]]
```

```
1

100

1889 13 14 1

2
```



```
100

200

3

4

5

6

7

100

200

8

100

200

1914 13 14 8

9

100

200

300

10

11

12

100

13

1921 13 14 13

14

15

16

17

100

18

19

20

21

22

23

24

100

25
```

26

27

100

28

100

29

30

100

31

32

33

34

35

36

37

100

200

38

39

40

100

41

42

43

44

100

45

100

46

47

100

48

49

50

100

51

52

53

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56

57

58

59

60

61

100

200

62

63

64

65

66

100

67

68

100

200

69

70

71

100

200

72

73

74

75

100

76

100

77

100

78

79

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80
81
82
83
84
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86
87
88
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90
91
92
93
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{2323.32, Null}
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colourtallys

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```

```
setskeep = Replace[setskeep, {76 → 81}, 2]
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```



```
setskeep = Sort[Table[Sort[setskeep[[i]]], {i, npeople}]]
```

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 {9, 28, 44, 62, 69, 79}, {9, 29, 31, 41, 77, 81}, {9, 31, 45, 49, 56, 68},
 {9, 33, 38, 47, 61, 77}, {10, 15, 26, 37, 47, 72}, {10, 15, 35, 64, 72, 80},
 {10, 18, 23, 31, 51, 78}, {10, 18, 23, 54, 55, 65}, {10, 22, 29, 33, 36, 62},
 {10, 26, 38, 61, 66, 81}, {10, 26, 38, 69, 75, 77}, {10, 31, 38, 69, 72, 80},
 {10, 38, 40, 63, 66, 74}, {10, 39, 43, 47, 57, 59}, {11, 13, 19, 33, 53, 66},
 {11, 20, 64, 69, 70, 81}, {11, 24, 30, 37, 43, 65}, {11, 28, 45, 64, 71, 81},
 {11, 31, 48, 54, 56, 70}, {12, 15, 34, 41, 55, 71}, {12, 16, 47, 62, 70, 78},
 {12, 20, 22, 29, 54, 64}, {12, 20, 28, 45, 53, 73}, {12, 30, 46, 53, 73, 78},
 {12, 37, 53, 61, 66, 71}, {12, 45, 55, 59, 68, 73}, {12, 53, 56, 58, 66, 67},
 {13, 18, 23, 28, 53, 81}, {13, 21, 23, 35, 37, 42}, {13, 21, 23, 45, 49, 71},
 {13, 24, 40, 51, 74, 78}, {13, 30, 44, 63, 65, 79}, {14, 18, 23, 48, 55, 67},
 {14, 19, 33, 36, 70, 74}, {14, 22, 47, 51, 63, 77}, {14, 25, 43, 47, 57, 78},
 {14, 30, 45, 59, 73, 77}, {15, 17, 19, 35, 49, 69}, {15, 17, 22, 40, 53, 60},
 {15, 27, 47, 59, 64, 73}, {15, 31, 36, 52, 59, 68}, {16, 20, 27, 44, 49, 57},
 {16, 30, 68, 72, 77, 80}, {16, 39, 50, 61, 72, 74}, {17, 21, 23, 55, 67, 78},
 {17, 30, 37, 49, 54, 71}, {18, 20, 25, 58, 63, 74}, {18, 24, 32, 49, 58, 78},
 {18, 28, 36, 41, 62, 70}, {18, 34, 46, 54, 71, 78}, {19, 30, 44, 49, 74, 81},
 {19, 45, 50, 64, 71, 77}, {20, 22, 27, 32, 37, 63}, {20, 24, 52, 60, 71, 79},
 {20, 40, 43, 48, 50, 75}, {20, 43, 46, 51, 59, 81}, {21, 25, 32, 42, 71, 73},
 {21, 39, 41, 50, 67, 79}, {21, 39, 44, 64, 68, 79}, {22, 27, 29, 56, 58, 75},
 {22, 36, 41, 51, 59, 64}, {23, 36, 50, 54, 55, 64}, {24, 32, 49, 52, 60, 80},
 {25, 31, 41, 54, 65, 75}, {25, 39, 41, 60, 65, 73}, {26, 31, 34, 48, 50, 66},
 {26, 33, 52, 60, 65, 79}, {26, 34, 42, 53, 57, 61}, {27, 37, 40, 59, 63, 65},
 {27, 46, 49, 53, 69, 78}, {30, 33, 35, 40, 44, 79}, {30, 35, 44, 70, 75, 79},
 {31, 36, 51, 53, 58, 80}, {31, 46, 54, 62, 69, 80}, {32, 37, 42, 45, 53, 55},
 {32, 40, 45, 48, 61, 65}, {33, 34, 50, 55, 72, 80}, {33, 40, 47, 55, 59, 77},
 {35, 37, 43, 51, 57, 59}, {35, 39, 40, 48, 61, 68}, {35, 39, 54, 55, 58, 62},
 {38, 43, 48, 54, 77, 80}, {39, 41, 46, 63, 64, 68}, {40, 48, 59, 64, 75, 80}}
```

```
Tally[Union[Sequence @@ subsskeep]] // Length
```

```
1921
```

```
Tally[Tally[Union[Sequence @@ subsskeep]][[All, 2]]]
```

```
{{1, 1921}}
```

```
Tally[Flatten[subsskeep, 1]] // Length
```

```
1921
```

```
Union[Sequence @@ subsskeep] // Length
```

```
1921
```

```
Tally[Flatten[subsskeep, 1]] // Length
```

```
1921
```

```
uniquepairskeep = Length[Union[Sequence @@ subsskeep]]
```

```
1921
```

```
subss3 = Table[Subsets[setskeep[[i]], {3}], {i, npeople}];
uniquetriples = Length[Union[Sequence @@ subss3]]
```

```
3536
```

```
repeatfreqs = Sort[Tally[Tally[Flatten[subsskeep, 1]][[All, 2]]]];
PrependTo[repeatfreqs, {"no. of repeats", "no. of pairs"}];
repeatfreqs // TableForm
```

no. of repeats	no. of pairs
1	1316
2	462
3	116
4	23
5	4

```
onetosix = {1, 2, 3, 4, 5, 6};
subsmax = Table[npeople * Length[Subsets[onetosix, {j}]], {j, 2, npicks}]
```

```
{2700, 3600, 2700, 1080, 180}
```

```
subssall = Table[Subsets[setskeep[[i]], {j}], {j, 2, npicks}, {i, npeople}];
uniques = Table[Length[Union[Sequence @@ subssall[[j]]]], {j, 1, npicks - 1}]
```

```
{1874, 3536, 2699, 1080, 180}
```

```
percentuniques = Round[100. uniques / subsmax, 0.01]
```

```
{69.41, 98.22, 99.96, 100., 100.}
```

```
uniquedata =
  Table[{i + 1, uniques[[i]], subsmax[[i]], percentuniques[[i]]}, {i, npicks - 1}];
PrependTo[uniquedata, {"unique set size (2=pair, 3=triple etc)",
   "no. unique", "max possible", "percentage unique"}];
uniquedata // TableForm
```

unique set size (2=pair, 3=triple etc)	no. unique	max possible	percentage unique
2	1874	2700	69.41
3	3536	3600	98.22
4	2699	2700	99.96
5	1080	1080	100.
6	180	180	100.

```
tallys = Tally[Flatten[setskeep]][[All, 2]]
```

```
{13, 13, 13, 14, 14, 14, 13, 14, 14, 14, 14, 13, 13, 13, 14, 14, 13, 13, 13, 13,
 13, 14, 14, 13, 13, 13, 13, 13, 14, 13, 14, 14, 14, 14, 13, 13, 13, 14,
 14, 14, 13, 14, 13, 13, 13, 14, 14, 13, 13, 14, 14, 14, 14, 13, 13, 14, 13, 14,
 14, 13, 14, 13, 14, 13, 14, 13, 14, 14, 14, 13, 13, 14, 13, 13, 14, 13, 14, 14}
```

```
tallynums = Sort[Tally[Flatten[setskeep]]];
PrependTo[tallynums, {"number", "tally"}];
tallynums // TableForm
```


number	tally
1	13
2	13
3	13
4	13
5	13
6	13
7	13
8	13
9	13
10	13
11	13
12	13
13	13
14	13
15	13
16	13
17	13
18	13
19	13
20	13
21	13
22	13
23	13
24	13
25	13
26	13
27	13
28	13
29	13
30	13
31	13
32	13
33	13
34	13
35	13
36	13
37	13
38	13
39	13
40	13
41	14
42	14
43	14
44	14
45	14
46	14
47	14

```
48    14
49    14
50    14
51    14
52    14
53    14
54    14
55    14
56    14
57    14
58    14
59    14
60    14
61    14
62    14
63    14
64    14
65    14
66    14
67    14
68    14
69    14
70    14
71    14
72    14
73    14
74    14
75    14
77    14
78    14
79    14
80    14
81    14
```

```
tallytots = Sort[Tally[tallys]];
PrependTo[tallytots, {"tallys", "frequency"}];
AppendTo[tallytots, {""}];
AppendTo[tallytots, {"min:", Min[tallys]}];
AppendTo[tallytots, {"max:", Max[tallys]}];
AppendTo[tallytots, {"mean:", 1. Mean[tallys]}];
AppendTo[tallytots, {"s.d.:", 1. StandardDeviation[tallys]}];
tallytots // TableForm
```

```
tallys    frequency
13        40
14        40

min:      13
max:      14
mean:     13.5
s.d.:     0.503155
```



```
colourtallys = Table[{Length[Intersection[setskeep[[i]], red]],
   Length[Intersection[setskeep[[i]], yellow]],
   Length[Intersection[setskeep[[i]], green]]}, {i, npeople}]
```

```
{{2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 3, 1}, {2, 2, 2}, {2, 2, 2}, {2, 3, 1}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2}, {1, 3, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2}, {1, 3, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {1, 3, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 3, 1},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 1, 3}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2},
 {2, 2, 2}, {2, 3, 1}, {2, 2, 2}, {2, 2, 2}, {2, 2, 2}, {1, 3, 2}, {2, 2, 2}, {2, 2, 2}}
```

```
Length[Union[Flatten[colourtallys]]]
```

```
3
```

```
colourtots = Sort[Tally[Flatten[colourtallys]]];
PrependTo[colourtots, {"no. of appearances of a colour in  a set", "frequency"}];
colourtots // TableForm
```

```
no. of appearances of a colour in  a set  frequency
1                                         23
2                                         494
3                                         23
```

```
export = 1
```

```
1
```

```
If[export == 1, Export["/Users/Greg/Documents/Tim/sets-10.xls",
  {Sort[setskeep], tallynums, tallytots, repeatfreqs, uniquedata, colourtots}]]
```

```
/Users/Greg/Documents/Tim/sets-10.xls
```

```
iterations6tot
```

```
45 425 095
```

```
iterations180tot
```

```
7864
```

Appendix R

Final BWS DCE design

This appendix contains the intended Best-Worst Scaling Discrete Choice Experiment (BWS DCE) choice sets to be shown to each of the 180 women's group members, 180 non-members in the same village, and 180 women in control villages. Identification numbers are to the left of each column and quality of life attribute-levels are numbered 1-81 according to Figure 6.2 on page 147, with red cards denoting 'bottom' levels, yellow cards, 'mid' levels, and green cards 'top' levels. Five women in each village were randomly sampled (see § 4.1.2.2 on page 79 for random selection procedure) and every fourth respondent was asked to complete the importance questions (Imp, ranking of each of the 27 quality of life questions on a scale of 1-5 of importance, see §6.5.4) and every 5th respondent was asked to complete the contingent valuation survey (see §7).

Women's Group members - 5 women per WG

1	1	5	20	46	63	69	76
2	1	6	41	43	48	78	76
3	1	7	14	29	42	57	76
4 Imp	1	9	14	17	37	63	76
5 CV	1	12	20	30	52	56	76
6	1	14	36	38	42	43	76
7	1	15	21	32	46	80	76
8	1	16	44	48	62	66	76
9 Imp	1	17	30	41	66	67	76
10 CV	1	17	42	43	54	56	76
11	1	19	23	26	63	78	76
12	1	24	47	67	74	81	76
13	1	27	29	32	57	61	76
14 Imp	2	4	11	24	45	58	76
15 CV	2	5	21	46	52	57	76
16	2	6	8	40	49	75	76
17	2	6	53	61	77	81	76
18	2	8	10	18	45	67	76
19 Imp	2	10	29	40	54	72	76
20 CV	2	12	24	31	59	73	76
21	2	13	43	69	74	77	76
22	2	16	31	50	69	78	76
23	2	20	34	48	55	69	76
24 Imp	2	25	30	47	77	79	76
25 CV	2	33	42	49	65	67	76
26	2	34	50	60	64	75	76
27	3	4	14	35	37	72	76
28	3	5	21	73	78	79	76
29 Imp	3	6	16	20	52	68	76
30 CV	3	8	19	37	47	57	76
31	3	11	24	28	56	61	76
32	3	13	18	25	38	59	76
33	3	14	16	39	56	79	76
34 Imp	3	17	28	33	46	74	76
35 CV	3	18	28	47	70	80	76
36	3	22	29	45	46	80	76
37	3	23	28	34	44	72	76
38	3	23	28	48	65	79	76
39 Imp	3	40	56	69	70	74	76
40 CV	4	10	38	53	60	63	76
41	4	11	58	65	72	75	76
42	4	12	27	28	32	44	76
43	4	13	21	30	32	62	76
44 Imp	4	21	29	33	35	58	76
45 CV	4	22	50	54	68	72	76

46	4	27	36	46	56	74	76
47	4	32	43	50	66	75	76
48	4	34	38	57	60	62	76
49 Imp	4	34	57	66	74	80	76
50 CV	4	39	58	65	68	81	76
51	5	7	13	27	54	74	76
52	5	7	14	24	51	58	76
53	5	11	25	34	39	75	76
54 Imp	5	15	18	46	67	74	76
55 CV	5	17	21	22	49	72	76
56	5	27	57	58	68	70	76
57	5	33	39	43	71	77	76
58	5	36	49	56	73	81	76
59 Imp	5	41	60	63	67	77	76
60 CV	5	48	49	52	60	71	76
61	6	7	38	44	52	75	76
62	6	11	16	25	42	62	76
63	6	13	26	45	55	71	76
64 Imp	6	15	29	46	68	70	76
65 CV	6	16	41	50	60	70	76
66	6	17	22	52	59	66	76
67	6	19	26	29	61	75	76
68	6	25	32	35	37	72	76
69 Imp	6	44	47	51	52	73	76
70 CV	7	11	22	36	65	72	76
71	7	15	21	26	28	62	76
72	7	19	24	36	41	56	76
73	7	23	29	51	66	67	76
74 Imp	7	25	36	38	60	71	76
75 CV	7	32	48	71	73	81	76
76	7	35	51	62	67	75	76
77	7	38	51	56	60	79	76
78	7	50	62	66	69	73	76
79 Imp	8	12	13	16	26	39	76
80 CV	8	12	28	42	52	65	76
81	8	15	16	19	23	42	76
82	8	16	24	25	45	68	76
83	8	17	42	51	64	70	76
84 Imp	8	18	19	27	29	70	76
85 CV	8	19	41	57	61	81	76
86	8	19	42	44	52	63	76
87	8	27	31	34	62	81	76
88	8	51	53	58	61	69	76
89 Imp	9	11	14	55	66	79	76
90 CV	9	11	15	17	25	61	76

Women's Group members continued- 5 women per WG

91	9	13	35	47	55	60	76
92	9	14	43	50	57	64	76
93	9	17	22	42	68	73	76
94 Imp	9	24	52	56	70	80	76
95 CV	9	26	33	34	67	78	76
96	9	26	44	58	63	67	76
97	9	28	44	62	69	79	76
98	9	29	31	41	77	81	76
99 Imp	9	31	45	49	56	68	76
100 CV	9	33	38	47	61	77	76
101	10	15	26	37	47	72	76
102	10	15	35	64	72	80	76
103	10	18	23	31	51	78	76
104 Imp	10	18	23	54	55	65	76
105 CV	10	22	29	33	36	62	76
106	10	26	38	61	66	81	76
107	10	26	38	69	75	77	76
108	10	31	38	69	72	80	76
109 Imp	10	38	40	63	66	74	76
110 CV	10	39	43	47	57	59	76
111	11	13	19	33	53	66	76
112	11	20	64	69	70	81	76
113	11	24	30	37	43	65	76
114 Imp	11	28	45	64	71	81	76
115 CV	11	31	48	54	56	70	76
116	12	15	34	41	55	71	76
117	12	16	47	62	70	78	76
118	12	20	22	29	54	64	76
119 Imp	12	20	28	45	53	73	76
120 CV	12	30	46	53	73	78	76
121	12	37	53	61	66	71	76
122	12	45	55	59	68	73	76
123	12	53	56	58	66	67	76
124 Imp	13	18	23	28	53	81	76
125 CV	13	21	23	35	37	42	76
126	13	21	23	45	49	71	76
127	13	24	40	51	74	78	76
128	13	30	44	63	65	79	76
129 Imp	14	18	23	48	55	67	76
130 CV	14	19	33	36	70	74	76
131	14	22	47	51	63	77	76
132	14	25	43	47	57	78	76
133	14	30	45	59	73	77	76
134 Imp	15	17	19	35	49	69	76
135 CV	15	17	22	40	53	60	76

136	15	27	47	59	64	73	76
137	15	31	36	52	59	68	76
138	16	20	27	44	49	57	76
139 Imp	16	30	68	72	77	80	76
140 CV	16	39	50	61	72	74	76
141	17	21	23	55	67	78	76
142	17	30	37	49	54	71	76
143	18	20	25	58	63	74	76
144 Imp	18	24	32	49	58	78	76
145 CV	18	28	36	41	62	70	76
146	18	34	46	54	71	78	76
147	19	30	44	49	74	81	76
148	19	45	50	64	71	77	76
149 Imp	20	22	27	32	37	63	76
150 CV	20	24	52	60	71	79	76
151	20	40	43	48	50	75	76
152	20	43	46	51	59	81	76
153	21	25	32	42	71	73	76
154 Imp	21	39	41	50	67	79	76
155 CV	21	39	44	64	68	79	76
156	22	27	29	56	58	75	76
157	22	36	41	51	59	64	76
158	23	36	50	54	55	64	76
159 Imp	24	32	49	52	60	80	76
160 CV	25	31	41	54	65	75	76
161	25	39	41	60	65	73	76
162	26	31	34	48	50	66	76
163	26	33	52	60	65	79	76
164 Imp	26	34	42	53	57	61	76
165 CV	27	37	40	59	63	65	76
166	27	46	49	53	69	78	76
167	30	33	35	40	44	79	76
168	30	35	44	70	75	79	76
169 Imp	31	36	51	53	58	80	76
170 CV	31	46	54	62	69	80	76
171	32	37	42	45	53	55	76
172	32	40	45	48	61	65	76
173	33	34	50	55	72	80	76
174 Imp	33	40	47	55	59	77	76
175 CV	35	37	43	51	57	59	76
176	35	39	40	48	61	68	76
177	35	39	54	55	58	62	76
178	38	43	48	54	77	80	76
179 Imp	39	41	46	63	64	68	76
180 CV	40	48	59	64	75	80	76

Non-members in the same village - 5 women per village

181	1	5	20	46	63	69	76
182	1	6	41	43	48	78	76
183	1	7	14	29	42	57	76
184 Imp	1	9	14	17	37	63	76
185 CV	1	12	20	30	52	56	76
186	1	14	36	38	42	43	76
187	1	15	21	32	46	80	76
188	1	16	44	48	62	66	76
189 Imp	1	17	30	41	66	67	76
190 CV	1	17	42	43	54	56	76
191	1	19	23	26	63	78	76
192	1	24	47	67	74	81	76
193	1	27	29	32	57	61	76
194 Imp	2	4	11	24	45	58	76
195 CV	2	5	21	46	52	57	76
196	2	6	8	40	49	75	76
197	2	6	53	61	77	81	76
198	2	8	10	18	45	67	76
199 Imp	2	10	29	40	54	72	76
200 CV	2	12	24	31	59	73	76
201	2	13	43	69	74	77	76
202	2	16	31	50	69	78	76
203	2	20	34	48	55	69	76
204 Imp	2	25	30	47	77	79	76
205 CV	2	33	42	49	65	67	76
206	2	34	50	60	64	75	76
207	3	4	14	35	37	72	76
208	3	5	21	73	78	79	76
209 Imp	3	6	16	20	52	68	76
210 CV	3	8	19	37	47	57	76
211	3	11	24	28	56	61	76
212	3	13	18	25	38	59	76
213	3	14	16	39	56	79	76
214 Imp	3	17	28	33	46	74	76
215 CV	3	18	28	47	70	80	76
216	3	22	29	45	46	80	76
217	3	23	28	34	44	72	76
218	3	23	28	48	65	79	76
219 Imp	3	40	56	69	70	74	76
220 CV	4	10	38	53	60	63	76
221	4	11	58	65	72	75	76
222	4	12	27	28	32	44	76
223	4	13	21	30	32	62	76
224 Imp	4	21	29	33	35	58	76
225 CV	4	22	50	54	68	72	76

226	4	27	36	46	56	74	76
227	4	32	43	50	66	75	76
228	4	34	38	57	60	62	76
229 Imp	4	34	57	66	74	80	76
230 CV	4	39	58	65	68	81	76
231	5	7	13	27	54	74	76
232	5	7	14	24	51	58	76
233	5	11	25	34	39	75	76
234 Imp	5	15	18	46	67	74	76
235 CV	5	17	21	22	49	72	76
236	5	27	57	58	68	70	76
237	5	33	39	43	71	77	76
238	5	36	49	56	73	81	76
239 Imp	5	41	60	63	67	77	76
240 CV	5	48	49	52	60	71	76
241	6	7	38	44	52	75	76
242	6	11	16	25	42	62	76
243	6	13	26	45	55	71	76
244 Imp	6	15	29	46	68	70	76
245 CV	6	16	41	50	60	70	76
246	6	17	22	52	59	66	76
247	6	19	26	29	61	75	76
248	6	25	32	35	37	72	76
249 Imp	6	44	47	51	52	73	76
250 CV	7	11	22	36	65	72	76
251	7	15	21	26	28	62	76
252	7	19	24	36	41	56	76
253	7	23	29	51	66	67	76
254 Imp	7	25	36	38	60	71	76
255 CV	7	32	48	71	73	81	76
256	7	35	51	62	67	75	76
257	7	38	51	56	60	79	76
258	7	50	62	66	69	73	76
259 Imp	8	12	13	16	26	39	76
260 CV	8	12	28	42	52	65	76
261	8	15	16	19	23	42	76
262	8	16	24	25	45	68	76
263	8	17	42	51	64	70	76
264 Imp	8	18	19	27	29	70	76
265 CV	8	19	41	57	61	81	76
266	8	19	42	44	52	63	76
267	8	27	31	34	62	81	76
268	8	51	53	58	61	69	76
269 Imp	9	11	14	55	66	79	76
270 CV	9	11	15	17	25	61	76

Non-members in the same village continued - 5 women per village

271	9	13	35	47	55	60	76
272	9	14	43	50	57	64	76
273	9	17	22	42	68	73	76
274 Imp	9	24	52	56	70	80	76
275 CV	9	26	33	34	67	78	76
276	9	26	44	58	63	67	76
277	9	28	44	62	69	79	76
278	9	29	31	41	77	81	76
279 Imp	9	31	45	49	56	68	76
280 CV	9	33	38	47	61	77	76
281	10	15	26	37	47	72	76
282	10	15	35	64	72	80	76
283	10	18	23	31	51	78	76
284 Imp	10	18	23	54	55	65	76
285 CV	10	22	29	33	36	62	76
286	10	26	38	61	66	81	76
287	10	26	38	69	75	77	76
288	10	31	38	69	72	80	76
289 Imp	10	38	40	63	66	74	76
290 CV	10	39	43	47	57	59	76
291	11	13	19	33	53	66	76
292	11	20	64	69	70	81	76
293	11	24	30	37	43	65	76
294 Imp	11	28	45	64	71	81	76
295 CV	11	31	48	54	56	70	76
296	12	15	34	41	55	71	76
297	12	16	47	62	70	78	76
298	12	20	22	29	54	64	76
299 Imp	12	20	28	45	53	73	76
300 CV	12	30	46	53	73	78	76
301	12	37	53	61	66	71	76
302	12	45	55	59	68	73	76
303	12	53	56	58	66	67	76
304 Imp	13	18	23	28	53	81	76
305 CV	13	21	23	35	37	42	76
306	13	21	23	45	49	71	76
307	13	24	40	51	74	78	76
308	13	30	44	63	65	79	76
309 Imp	14	18	23	48	55	67	76
310 CV	14	19	33	36	70	74	76
311	14	22	47	51	63	77	76
312	14	25	43	47	57	78	76
313	14	30	45	59	73	77	76
314 Imp	15	17	19	35	49	69	76
315 CV	15	17	22	40	53	60	76

316	15	27	47	59	64	73	76
317	15	31	36	52	59	68	76
318	16	20	27	44	49	57	76
319 Imp	16	30	68	72	77	80	76
320 CV	16	39	50	61	72	74	76
321	17	21	23	55	67	78	76
322	17	30	37	49	54	71	76
323	18	20	25	58	63	74	76
324 Imp	18	24	32	49	58	78	76
325 CV	18	28	36	41	62	70	76
326	18	34	46	54	71	78	76
327	19	30	44	49	74	81	76
328	19	45	50	64	71	77	76
329 Imp	20	22	27	32	37	63	76
330 CV	20	24	52	60	71	79	76
331	20	40	43	48	50	75	76
332	20	43	46	51	59	81	76
333	21	25	32	42	71	73	76
334 Imp	21	39	41	50	67	79	76
335 CV	21	39	44	64	68	79	76
336	22	27	29	56	58	75	76
337	22	36	41	51	59	64	76
338	23	36	50	54	55	64	76
339 Imp	24	32	49	52	60	80	76
340 CV	25	31	41	54	65	75	76
341	25	39	41	60	65	73	76
342	26	31	34	48	50	66	76
343	26	33	52	60	65	79	76
344 Imp	26	34	42	53	57	61	76
345 CV	27	37	40	59	63	65	76
346	27	46	49	53	69	78	76
347	30	33	35	40	44	79	76
348	30	35	44	70	75	79	76
349 Imp	31	36	51	53	58	80	76
350 CV	31	46	54	62	69	80	76
351	32	37	42	45	53	55	76
352	32	40	45	48	61	65	76
353	33	34	50	55	72	80	76
354 Imp	33	40	47	55	59	77	76
355 CV	35	37	43	51	57	59	76
356	35	39	40	48	61	68	76
357	35	39	54	55	58	62	76
358	38	43	48	54	77	80	76
359 Imp	39	41	46	63	64	68	76
360 CV	40	48	59	64	75	80	76

Control area women - 5 women per village

361	1	5	20	46	63	69	76
362	1	6	41	43	48	78	76
363	1	7	14	29	42	57	76
364 Imp	1	9	14	17	37	63	76
365 CV	1	12	20	30	52	56	76
366	1	14	36	38	42	43	76
367	1	15	21	32	46	80	76
368	1	16	44	48	62	66	76
369 Imp	1	17	30	41	66	67	76
370 CV	1	17	42	43	54	56	76
371	1	19	23	26	63	78	76
372	1	24	47	67	74	81	76
373	1	27	29	32	57	61	76
374 Imp	2	4	11	24	45	58	76
375 CV	2	5	21	46	52	57	76
376	2	6	8	40	49	75	76
377	2	6	53	61	77	81	76
378	2	8	10	18	45	67	76
379 Imp	2	10	29	40	54	72	76
380 CV	2	12	24	31	59	73	76
381	2	13	43	69	74	77	76
382	2	16	31	50	69	78	76
383	2	20	34	48	55	69	76
384 Imp	2	25	30	47	77	79	76
385 CV	2	33	42	49	65	67	76
386	2	34	50	60	64	75	76
387	3	4	14	35	37	72	76
388	3	5	21	73	78	79	76
389 Imp	3	6	16	20	52	68	76
390 CV	3	8	19	37	47	57	76
391	3	11	24	28	56	61	76
392	3	13	18	25	38	59	76
393	3	14	16	39	56	79	76
394 Imp	3	17	28	33	46	74	76
395 CV	3	18	28	47	70	80	76
396	3	22	29	45	46	80	76
397	3	23	28	34	44	72	76
398	3	23	28	48	65	79	76
399 Imp	3	40	56	69	70	74	76
400 CV	4	10	38	53	60	63	76
401	4	11	58	65	72	75	76
402	4	12	27	28	32	44	76
403	4	13	21	30	32	62	76
404 Imp	4	21	29	33	35	58	76
405 CV	4	22	50	54	68	72	76

406	4	27	36	46	56	74	76
407	4	32	43	50	66	75	76
408	4	34	38	57	60	62	76
409 Imp	4	34	57	66	74	80	76
410 CV	4	39	58	65	68	81	76
411	5	7	13	27	54	74	76
412	5	7	14	24	51	58	76
413	5	11	25	34	39	75	76
414 Imp	5	15	18	46	67	74	76
415 CV	5	17	21	22	49	72	76
416	5	27	57	58	68	70	76
417	5	33	39	43	71	77	76
418	5	36	49	56	73	81	76
419 Imp	5	41	60	63	67	77	76
420 CV	5	48	49	52	60	71	76
421	6	7	38	44	52	75	76
422	6	11	16	25	42	62	76
423	6	13	26	45	55	71	76
424 Imp	6	15	29	46	68	70	76
425 CV	6	16	41	50	60	70	76
426	6	17	22	52	59	66	76
427	6	19	26	29	61	75	76
428	6	25	32	35	37	72	76
429 Imp	6	44	47	51	52	73	76
430 CV	7	11	22	36	65	72	76
431	7	15	21	26	28	62	76
432	7	19	24	36	41	56	76
433	7	23	29	51	66	67	76
434 Imp	7	25	36	38	60	71	76
435 CV	7	32	48	71	73	81	76
436	7	35	51	62	67	75	76
437	7	38	51	56	60	79	76
438	7	50	62	66	69	73	76
439 Imp	8	12	13	16	26	39	76
440 CV	8	12	28	42	52	65	76
441	8	15	16	19	23	42	76
442	8	16	24	25	45	68	76
443	8	17	42	51	64	70	76
444 Imp	8	18	19	27	29	70	76
445 CV	8	19	41	57	61	81	76
446	8	19	42	44	52	63	76
447	8	27	31	34	62	81	76
448	8	51	53	58	61	69	76
449 Imp	9	11	14	55	66	79	76
450 CV	9	11	15	17	25	61	76

Control area women continued - 5 women per village

451	9	13	35	47	55	60	76
452	9	14	43	50	57	64	76
453	9	17	22	42	68	73	76
454 Imp	9	24	52	56	70	80	76
455 CV	9	26	33	34	67	78	76
456	9	26	44	58	63	67	76
457	9	28	44	62	69	79	76
458	9	29	31	41	77	81	76
459 Imp	9	31	45	49	56	68	76
460 CV	9	33	38	47	61	77	76
461	10	15	26	37	47	72	76
462	10	15	35	64	72	80	76
463	10	18	23	31	51	78	76
464 Imp	10	18	23	54	55	65	76
465 CV	10	22	29	33	36	62	76
466	10	26	38	61	66	81	76
467	10	26	38	69	75	77	76
468	10	31	38	69	72	80	76
469 Imp	10	38	40	63	66	74	76
470 CV	10	39	43	47	57	59	76
471	11	13	19	33	53	66	76
472	11	20	64	69	70	81	76
473	11	24	30	37	43	65	76
474 Imp	11	28	45	64	71	81	76
475 CV	11	31	48	54	56	70	76
476	12	15	34	41	55	71	76
477	12	16	47	62	70	78	76
478	12	20	22	29	54	64	76
479 Imp	12	20	28	45	53	73	76
480 CV	12	30	46	53	73	78	76
481	12	37	53	61	66	71	76
482	12	45	55	59	68	73	76
483	12	53	56	58	66	67	76
484 Imp	13	18	23	28	53	81	76
485 CV	13	21	23	35	37	42	76
486	13	21	23	45	49	71	76
487	13	24	40	51	74	78	76
488	13	30	44	63	65	79	76
489 Imp	14	18	23	48	55	67	76
490 CV	14	19	33	36	70	74	76
491	14	22	47	51	63	77	76
492	14	25	43	47	57	78	76
493	14	30	45	59	73	77	76
494 Imp	15	17	19	35	49	69	76
495 CV	15	17	22	40	53	60	76

496	15	27	47	59	64	73	76
497	15	31	36	52	59	68	76
498	16	20	27	44	49	57	76
499 Imp	16	30	68	72	77	80	76
500 CV	16	39	50	61	72	74	76
501	17	21	23	55	67	78	76
502	17	30	37	49	54	71	76
503	18	20	25	58	63	74	76
504 Imp	18	24	32	49	58	78	76
505 CV	18	28	36	41	62	70	76
506	18	34	46	54	71	78	76
507	19	30	44	49	74	81	76
508	19	45	50	64	71	77	76
509 Imp	20	22	27	32	37	63	76
510 CV	20	24	52	60	71	79	76
511	20	40	43	48	50	75	76
512	20	43	46	51	59	81	76
513	21	25	32	42	71	73	76
514 Imp	21	39	41	50	67	79	76
515 CV	21	39	44	64	68	79	76
516	22	27	29	56	58	75	76
517	22	36	41	51	59	64	76
518	23	36	50	54	55	64	76
519 Imp	24	32	49	52	60	80	76
520 CV	25	31	41	54	65	75	76
521	25	39	41	60	65	73	76
522	26	31	34	48	50	66	76
523	26	33	52	60	65	79	76
524 Imp	26	34	42	53	57	61	76
525 CV	27	37	40	59	63	65	76
526	27	46	49	53	69	78	76
527	30	33	35	40	44	79	76
528	30	35	44	70	75	79	76
529 Imp	31	36	51	53	58	80	76
530 CV	31	46	54	62	69	80	76
531	32	37	42	45	53	55	76
532	32	40	45	48	61	65	76
533	33	34	50	55	72	80	76
534 Imp	33	40	47	55	59	77	76
535 CV	35	37	43	51	57	59	76
536	35	39	40	48	61	68	76
537	35	39	54	55	58	62	76
538	38	43	48	54	77	80	76
539 Imp	39	41	46	63	64	68	76
540 CV	40	48	59	64	75	80	76

Appendix S

Alternative utility tariff constructions

The following three graphs (Figure S.1-Figure S.3) respectively represent the utility tariffs constructed, using the methods described in § 6.4.3 on page 155, from: a) the raw log odds model coefficients, x, for the women's group study arm (see Table 6.2 on page 165); b) the same raw coefficients exponentiated as odds ratios: e^x; and, c) the same raw coefficients converted to probabilities: $\frac{e^x}{1+e^x}$. The box and whiskers plots in each graph represent the 5 levels as follows: the utility score of level 1 (the lowest level - 'bottom') is at the bottom end of the bottom whisker; the utility score of level 2 is the value at the bottom of the box; the utility score of level 3 ('mid') is the value at the line inside the box; the utility score of level 4 is the value at the top of the box; and the utility score of level 5 (the highest level -'top') is the value at the top end of the top whisker.

Figure S.1: Utility tariff using raw log odds model coefficients

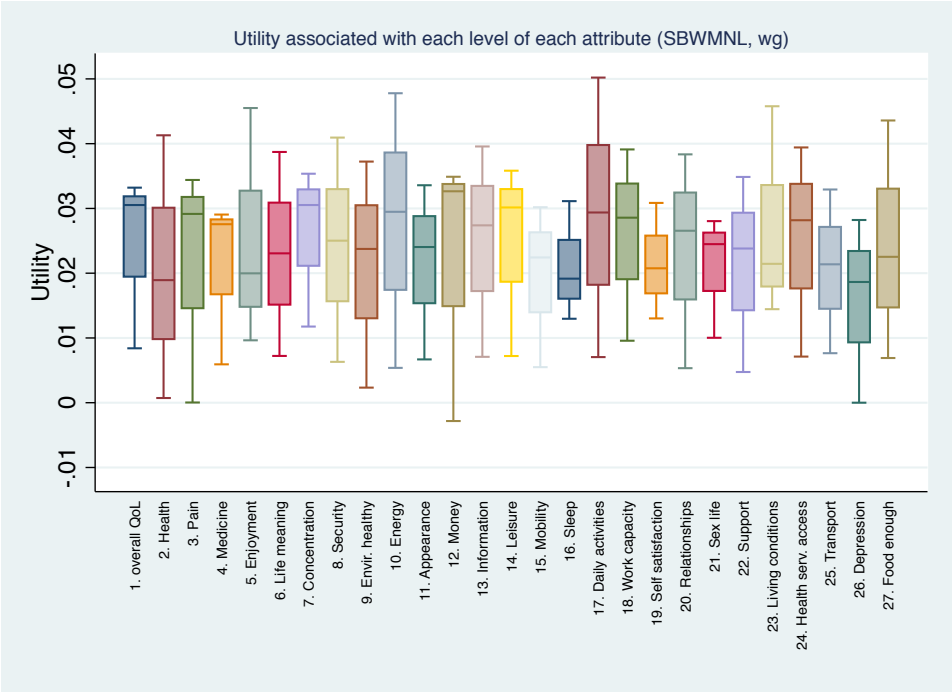


Figure S.2: Utility tariff using exponentiated odds ratio model coefficients

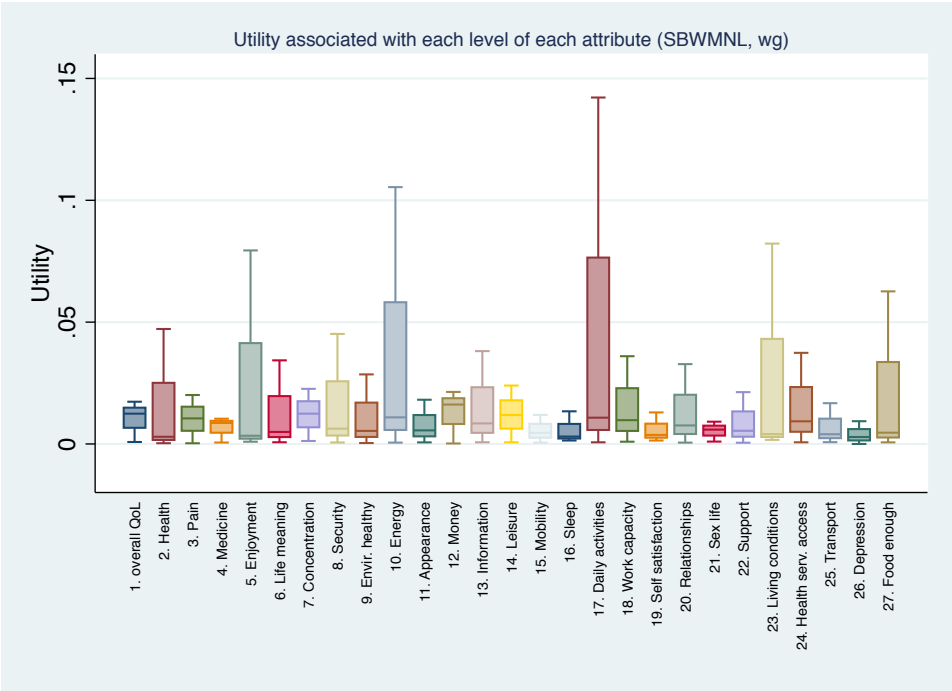
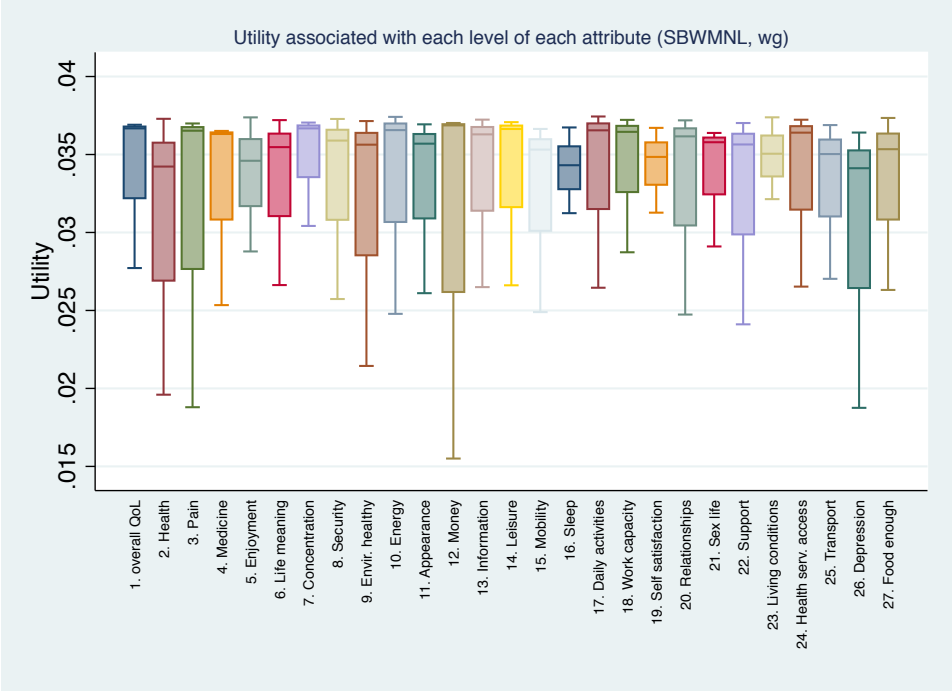


Figure S.3: Utility tariff using raw log odds model coefficients converted to probabilities



Appendix T

Contingent Valuation questionnaire - final English paper version

Contingent Valuation of MaiKhanda Women's Groups – How much are they worth to you?

A. Screening Questions

1. Have you heard of the MaiKhanda Women's Groups? Yes / No
   If No, go to Section C

2. Have you ever attended a MaiKhanda Women's Group? Yes / No
   If Yes, go to question 4.

B. Background knowledge, attitudes and practices relating to Women's Groups

3. Do you know anyone who is a member? Yes / No Go to question 5

4. How many Women's Group meetings have you attended? _____

5. Overall, What do you think of the Women's Groups? Probe for positive/negative attitudes.

_____

_____

_____

_____

6. Do you think the Women's Groups have benefits you have not already mentioned? If so, what are these?

Yes / No

If Yes, benefits are: _____

_____

_____

_____

_____

7. Do you think there are problems with the Women's Groups that you have not already mentioned? If so, what are these?

Yes / No

If Yes, problems are: _____

_____

_____

_____

_____

8. How much do you think a Women's Group costs to run every month?

_____K

C. Other background questions

9. Can you read and write? No – Illiterate Yes – can read only
Yes – can write only Yes – can read and write

10. a) Do you think the risk to Maternal and Neonatal Health in your community is high or low?

High Low

b) Why? _____

_____

_____

_____

11. How many Ante-natal Care (ANC) visits did you have during your last pregnancy?

_____ write N/A if never been pregnant before

12. Where did you deliver you last baby?

Home TBA Health Facility Road

Write N/A if never had a baby before

D. Description of this study and the Contingent Valuation Scenario

MaiKhanda Women's Groups meet regularly to discuss maternal and neonatal health problems. Each group contains 10-30 members. Groups will hold eight monthly meetings, discussing maternal and neonatal problems and strategising solutions. Strategies are then implemented by the group and evaluated by the group. The cycle of meetings, implementation and evaluation can then recommence.

The Women's Group programme is currently implemented by MaiKhanda but after January 2012 MaiKhanda's funding finishes. At this stage it may fall to local communities to fund the programme.

People *may* decide to give up their time, crops or pay money for the Women's Groups because they think it is beneficial to themselves and/or other members of their community. Alternatively people *may not* be willing to give up their time, crops or pay for the Women's Groups as they don't think they are beneficial or they think the benefits are not large enough to warrant them not spending their money/time on other things they need or want.

This exercise is intended to determine whether the MaiKhanda Groups are valuable to you.

The decision you make should reflect your current financial situation (how much you are able to pay).

13. As a member of this community would you be willing to pay money, maize flour or give up some of your time for the Women's Group programme to continue in 2012?

Yes No (go to question 25)

E. Details of Payment

14. Would you be mainly willing to contribute:

a. Money (go to question 15)
b. Time (go to question 19)
c. Maize flour (go to question 21)

Money:

Firstly, I'd like to ask you how much money you spend on other things.

15. How much did your household spend last month?

a) on all food (e.g. nsima, relish, salt, sugar, cooking oil)? _____

b) on agriculture (farm inputs)?_____

c) on rent? _____

d) on transport? _____

e) on education? _____

f) on healthcare? _____

g) on social activities?_____

h) on other things (e.g. clothes, animals, consumer items)? _____

i) total cash expenditure = sum of a) to h) = _____

16. How much money were the goods given to your household / acquired through barter/exchange worth?

_____

17. Total expenditure cash and non-cash = 15 i) + 16 = _____

The amount you state you are willing to pay for the Women's Group must be an amount that you are also able to pay, taking into account the fact that you have other things to spend your money on i.e. if you pay a certain amount for the Women's Groups you will not be able to spend that money on other things such as you have detailed above.

18. Using the figure below as a guide (you can state amounts in between those given on the figure), how much are you willing to pay *every month* for the Women's Groups to continue running in 2012? [Upper limit should be total expenditure in previous month – question 17)] Interviewer should frame the amount by drawing the scale from 0K to total expenditure (q17) below and explain that they should choose an amount between these two points on the scale. It is already assumed that the respondent will pay something (more than 0K) as they said 'Yes' to question 13.

0K_____

Go to question 23

Time:

Firstly, I'd like to ask you how much time you spend on other things.

19. How much time did you spend last week on?

a) Cooking _____

b) Cleaning _____

c) Looking after children _____

d) other housework (e.g. fetching water)

e) Farming _____

f) other work (e.g. a job) _____

g) Social activities _____

h) Total time = sum of a) to g) _____

The amount of time you state you are willing to give up must be an amount that you are also able to give up, taking into account other things you spend your time on as detailed above.

20. Using the figure below as a guide, how much time are you willing to spend *every week* for the Women's Groups to continue running in 2012? [Upper limit should be total time spent in previous week – question 19 h)] Interviewer should frame the amount by drawing the scale from 0h to total time expenditure (q19h) below and explain that they should choose an amount between these two points on the scale. It is already assumed that the respondent will give up some time (more than 0hrs) as they said 'Yes' to question 13.

0 hours_____

Go to question 23

Maize Flour:

Firstly, I'd like to ask you how much maize flour you use for other purposes.

21. How much maize flour did your household use last month for?

a) Feeding members of your household _____

b) Feeding other people _____

c) Selling to other people _____

d) Giving to other people (e.g. in exchange for something else) _____

e) Total maize flour used last month = sum of a) to d) _____

The amount of maize flour you state you are willing to give up must be an amount that you are also able to give up, taking into account the amount of maize flour you need for other things as detailed above.

22. Using the figure below as a guide, how much maize flour are you willing to donate *every month* for the Women's Groups to continue running in 2012? The maize flour could be used directly by the groups or sold to provide other things for the group [Upper limit should be amount of maize flour the woman's household uses in a month as given in question 21 e) above] Interviewer should frame the amount by drawing the scale from 0kg to the upper limit (q21e) and explain that they should choose an amount between these two points on the scale. It is already assumed that the respondent will give up some maize flour (more than 0kg) as they said 'Yes' to question 13.

0kg_____

Go to question 23

F. Reasons for response

23. You decided to pay something, why did you decide this? Probe for health and non-health benefits. Also probe for existence value (like to know it is there even if they won't use it), option value (like to have the option to get involved in WG in the future even though they don't plan to now) and altruism (benefits for others) if positive WTP.

_____

_____

_____

_____

_____

Do not prompt people to change their mind – but if they decide they want to change their mind let them (go back to the relevant section)

24. Did you have any problems answering the question on how much you would give?

Yes / No

If yes problem was: _____

_____

_____

_____

_____

End of questionnaire

25. You have decided not to pay anything, why did you decide this? Probe for inability to pay or negative aspects of women's groups

_____

_____

_____

_____

_____

Do not prompt people to change their mind – but if they decide they want to change their mind let them (go back to the relevant section)

End of questionnaire

Appendix U

Thematic Analysis of Contingent Valuation qualitative data

THEMES (alternative wording)

B5: Overall, What do you think of the Women's Groups?

B6: Do you think the Women's Groups have benefits you have not already mentioned? If so, what are these?

F23: You decided to pay something, why did you decide this? Probe for health and non-health benefits. Also probe for existence value (like to know it is there even if they won't use it), option value (like to have the option to get involved in WG in the future even though they don't plan to now) and altruism (benefits for others) if positive WTP.

CV only (others themes from FGD)

SUB-THEMES (Specifics)	CV q.	id	arm	answer
Delivery place was in village/TBA, now HF (because of MaiKhanda)	B5	5	1 WG member	The groups have helped us appreciate rushing to the hospital once we or a child are sick
	B5	20	1 WG member	Through the messsages Maikhanda groups spread I have learn together with others that delivering at TBAs is a risky behaviour
	B5	23	1 WG member	These help women who are expecting not to get sick for they go to the hospital. This is so because they teach us the impotance of going to the hospital for delivery. Due to thiss i have no negative thoughts about maikhanda
	B5	30	1 WG member	I love the group because in has helped us to understand more things such as the importance of going to deliver at the hospital.
	B5	35	1 WG member	The groups have benefited us alot in that they encourage us to go in good time to the hospital for delivery
	B5	50	1 WG member	They have helped increase number of hospital deliveries
	B5	55	1 WG member	The groups are to some a time waster while to me they have helped reduce cases of miscarrriagiees because expectant women are through the groups encouraged to deliver at the hospital
	B5	65	1 WG member	Very helpful. Women now know the importance of a hospital as compared to birth attendants.
	B5	75	1 WG member	Encourage delivery at hospital
	B5	80	1 WG member	Have realised the goodness of delivering at hospital who can determine whether one is anaemic
	B5	105	1 WG member	I like what the groups are doing. Women now go for antenatal clinic and they deliver at hospitals not at TBAs or at home.
	B5	150	1 WG member	It has helped us alot in delivering at hospital and early attending of antenatal clinic.
	B5	165	1 WG member	I am happy with the groups, many women go to the hospital for antenatal and delivery and maternal and infant mortality has decreased. Nothing negative.
	B5	180	1 WG member	It has taugh us alot like that of hospital delivering not TBA. Problems which we met during delivery has been reduced
	B5	185	2 Non-member in same village	discouraging delivery at TBAs
	B5	265	2 Non-member in same village	Its a good group since it provides ambulance bike to ferry the sick to hospital.
	B5	270	2 Non-member in same village	They teach people actual facts that they have to deliver in hospital
	B5	310	2 Non-member in same village	They encourage women to deliver at hospitals and not home or TBAs.
	B5	315	2 Non-member in same village	Encourages women to deliver at the hospital.
	B5	370	3 Control area woman	Good because it discourages women to deliver at home.
	B6b	25	1 WG member	Encourage delivering at the hospital thereeby reducing number of miscarriagies
	B6b	60	1 WG member	Discussions encourage women to do exercise in preparation for delivery, encourage women to go for clinic thereby reducing mothers' deaths
	B6b	115	1 WG member	Many women now rush to the hospital for maternal care
	B6b	130	1 WG member	People rush to the hospital when they are pregnant and it has helped decrease maternal deaths
	B6b	225	2 Non-member in same village	The groups also encourage mothers to deliver at the hospital
	B6b	230	2 Non-member in same village	Discourage delivering at TBAs
	B6b	260	2 Non-member in same village	They women know many things which we do not know like the goodness of hospital baby delivery.
	B6b	535	3 Control area woman	Encouraging women to deliver in the hospital
(WTP to help people deliver in hospital)	B6b	400	3 Control area woman	I feel there is need to help those who still don't rush to the hospital
Good experience at hospital (better than TBA/Home)	B5	145	1 WG member	They encourage women to visit health facilities.
	B5	190	2 Non-member in same village	The members are told to rush to the hospital when they fall sick
	B5	215	2 Non-member in same village	The messages are good; 'we should go to the hospital to seek healthcare'
	B5	230	2 Non-member in same village	The groups teach good things i.e. Going to the hospital in good time to seek medical attention
	B6b	155	1 WG member	Women have learnt to go to the hospital for maternal health.
	B6b	210	2 Non-member in same village	The common message preached by these groups is; rush to the hospital whenever you fall sick
(iron tablets, malaria medicine and mosquito net)	B6b	220	2 Non-member in same village	Encourage mothers to practice safemotherhood i.e. Use of mosquito nets
Maternal experience good in general	B5	60	1 WG member	The groups discuss how to attain good health; to have a safe delivery when preganant
	B5	95	1 WG member	These group are good and very helpful
	B5	100	1 WG member	They are very helpful in issues of safe motherhood.
	B5	115	1 WG member	I like the groups because they are really helping women on martenal health
	B5	135	1 WG member	The groups need to continue. They are good, we've learnt a lot and martenal health has improved.
	B5	165	1 WG member	I am happy with the groups, many women go to the hospital for antenatal and delivery. Nothing negative.
	B5	210	2 Non-member in same village	The groups promote safe motherhood
	B5	235	2 Non-member in same village	They promote safe motherhood which is good
	B5	245	2 Non-member in same village	The groups work towards good health of the mother and the baby

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
		B5	340	2 Non-member in same village	They are very good especially to those who are still bearing children.
		B5	530	3 Control area woman	They are nice groups, they help a lot as regards maternal health
		F23	35	1 WG member	To promote safemotherhood
		F23	190	2 Non-member in same village	To help sustain safe motherhood initiaves
		F23	200	2 Non-member in same village	I am committed to see the groups sustained so as to promote safe motherhood
	WG Facilitation too infrequent	B5	25	1 WG member	The groups are helful but the duration the facilitators take before coming again are too long
		B7b	105	1 WG member	They are not frequently visited and moniitored.
	Reducing deaths	B5	40	1 WG member	The groups have helped reduced deaths petaining to delivery
		B5	85	1 WG member	Its a good group and has helped to open our eyes, women now rush to healh facilities and martenal deaths have decreased.
		B5	105	1 WG member	I like what the groups are doing. We have low infant mortality.
		B5	165	1 WG member	maternal and infant mortality has decreased.
		B5	185	2 Non-member in same village	I feel the groups help promote safe motherhood by reducing maternal and death of babies by discouraging delivery at TBAs
		B5	225	2 Non-member in same village	The are good groups that work towards reducing death of babies
		B5	275	2 Non-member in same village	There awareness campign focus on reducing the death rate.
		B5	355	2 Non-member in same village	Has reduced the death rate of women and the babies
		B6b	150	1 WG member	Reduction in maternal deaths
		B6b	215	2 Non-member in same village	The community has experienced low mothers' and babies' deaths
		F23	25	1 WG member	To help maintain the goups's effort in reducing women's and children's deaths
		F23	40	1 WG member	I am committed to reduce deaths of mothers and babies
		F23	50	1 WG member	Want to be part of the success storry of fighting death of mothers and children
		F23	80	1 WG member	To help reduce mothers' deaths
		F23	330	2 Non-member in same village	The groups are really helping in reducing martenal mortality.
		F23	345	2 Non-member in same village	Because the group is teaching us alot on reduction in matenal and infants deaths
		F23	375	3 Control area woman	I feel that there is need to help reduce maternal deaths in this area and these groups can help.
		F23	445	3 Control area woman	To help reduce maternal and infant deaths.
	(miscarriages)	B5	70	1 WG member	Groups have helped reduce miscarrriagies
		B6b	35	1 WG member	There has been reduced cases of misccarriagies
		B6b	40	1 WG member	Miscarriagies are very low now
		F23	230	2 Non-member in same village	Want to help reduce miscarriagies
	Group is Helping/Benefiting people	F23	90	1 WG member	I see that the groups are very helpful
		F23	180	1 WG member	To help others who seek the help and also to sustain the group.
		F23	340	2 Non-member in same village	The group really helps a lot of people in this area and it needs to be suistained.
		F23	360	2 Non-member in same village	Thre are still more people who need help from these groups
		F23	460	3 Control area woman	I feel that those groups can be very helpful
	(mothers and babies)	F23	185	2 Non-member in same village	I would not want the groups die because they have played a very big role in improving health of mothers and children
		F23	235	2 Non-member in same village	I believe the future of the community begins with the health of mothers and babies
	(women)	F23	23	1 WG member	Since its helping women i have opted to help with the little i have so that it should not end
		F23	120	1 WG member	The groups are really helping, i am a woman and still in reproductive age.
		F23	350	2 Non-member in same village	For the groups to continue helping women on maternal health
		F23	480	3 Control area woman	I am still in the reproductive age
		F23	540	3 Control area woman	So that women should be helped
	(children)	F23	30	1 WG member	Am hoping that it will also help our children in future
		F23	340	2 Non-member in same village	I also have children who may need this help.
	(whole village/community)	B6b	105	1 WG member	Its not just benefiting members only but the whole village
		F23	20	1 WG member	I feel the groups sustainability rely in the hands of those who have experienced the goodness such groups have brought to the community
		F23	115	1 WG member	It will benefit people of this village of which many are my relatives
		F23	140	1 WG member	I am satisfied with what the groups are doing to our community
		F23	175	1 WG member	The groups benefit everybody in this village including me
		F23	225	2 Non-member in same village	I just love giving towards activities that benefit my community
		F23	330	2 Non-member in same village	I feel oblidged because i am in this same community. We need to help each other and this is something i can afford.

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
		F23	490	3 Control area woman	I feel that the groups can benefit my own village
	(poor people)	F23	155	1 WG member	We know that there are some people who are very poor and this can serve someone.
		F23	160	1 WG member	The group should be sustainable. This will be used to help the needy as well as food for the group members when need
		F23	315	2 Non-member in same village	This is to ensure sustainability of the group. This contribution will help those in needy mainly those who are pregnant
	Complement/Help MaiKhanda's efforts	F23	45	1 WG member	In order to complement Maikhanda's efforts
	Group needs money to run	F23	75	1 WG member	I am convinced no group can run without finances
	(money used to access healthcare)	F23	170	1 WG member	The money can alsobe used to access medical attention
		F23	335	2 Non-member in same village	I think the money can be used as transport when one is in needy for immediate medical attention
	(money used to console families of deceased)	F23	170	1 WG member	The money can also be used to console the deceased families
	(for transport for facilitators/teachers)	F23	285	2 Non-member in same village	The money can be used as transport for those who want to teach us
	(for materials for group)	F23	285	2 Non-member in same village	This money can also be used to procure some materials to be used
	(money for food)	F23	450	3 Control area woman	This may enable the group to proceed. My contribution can be used to buy food items and other things.
	Ufa used to feed people (needy)/for events	F23	265	2 Non-member in same village	This flour can be used to help the needy in the group or used during some events.
		F23	290	2 Non-member in same village	To help the group so that it sustain. This can be used to cook for the visitors even during gatherings.
		F23	320	2 Non-member in same village	I want it to be sustained. This will be used to cook food for the visitors
		F23	325	2 Non-member in same village	I have decided to give flour becouse its what i can manage. I think there is alot of benefits from it since we gain energy as well as making the stomache full
		F23	395	3 Control area woman	This can be used to help others or used by ourself when needed. This is to allow the existence of the group as well as sustaining it.
		F23	405	3 Control area woman	This flour can be used to feed people in times of needy like in a gathering
		F23	420	3 Control area woman	This flour will be used in times of gatherings as well as helping the needy.
		F23	425	3 Control area woman	To assist in the formation and sustaining of the group. The flour will be used during gatherings as well as helping the needy.
		F23	455	3 Control area woman	Am just interested with their work. My contributions will be used to fed people
		F23	485	3 Control area woman	To ensure sustainability ot the group. This contribution will be used to fed those working with the group.
	Group is good/important/I like it (non-specific)	F23	85	1 WG member	I am a member and i know that the groups are good in so many ways
		F23	100	1 WG member	I have been a member and i know how important these groups are
		F23	430	3 Control area woman	Just helping because there is a call for that
		F23	500	3 Control area woman	I just like what the groups do.
	(want group to continue/be sustained)	F23	105	1 WG member	I like what the groups are doing and i would love to see them go on
		F23	110	1 WG member	I like th groups and would like to see it continuing
		F23	125	1 WG member	I would like to see this group go on and on
		F23	135	1 WG member	I would want to see the group functioning the same way it is now
		F23	145	1 WG member	The group is good and i would love to see it continue
		F23	165	1 WG member	I am happy with what the groups are doing and i cant be happy to see the group dying
		F23	170	1 WG member	To sustain the group.
		F23	270	2 Non-member in same village	Just to sustain the group since I have realise that they are doing good for us.
		F23	280	2 Non-member in same village	It can be used during the groups gathering. This may sustain the group.
		F23	475	3 Control area woman	To sustain the group.
	(want group to be formed/sustained)	F23	380	3 Control area woman	I want the group in our area and sustaining it.
		F23	440	3 Control area woman	This is to assist in the formation and sustaining of the group
		F23	510	3 Control area woman	Because we want the group in our area

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
		F23	520	3 Control area woman	We want the group
		F23	535	3 Control area woman	This just to agree that we want the group. This group may teach us a lot about child bearing and family planning methods
	(group worthwhile/spend time on it)	F23	130	1 WG member	I am used to giving my time to this group and i find it worth while.
	Rewarding	F23	55	1 WG member	Supporting the groups is very rewarding
	Want to join	F23	205	2 Non-member in same village	Since i want to join it must also help that it should not close down
		F23	410	3 Control area woman	I am so touched with maternal health issues and i would love to take part in that
		F23	415	3 Control area woman	I feel that the groups do good things and i can really help in that
		F23	470	3 Control area woman	I want to be part of the group and see the fruits. My contribution will be used to fed people.
	Don't know why they are WTP	F23	295	2 Non-member in same village	I dont know
	Encourage others	F23	310	2 Non-member in same village	My presence to the group can give encouragement to other women in such doing sustaining the group.
	Knowledge	B5	110	1 WG member	They are good and educative especially to those who are still reproductive
		B5	120	1 WG member	The groups are good, when a women are pregnant they are told about what to do and they are followed up
		B5	125	1 WG member	We have learnt a lot and i would like to see the groups continue. We have learn about marternal health and so many other things.
		B5	130	1 WG member	I like the groups, we've learnt a lot from them and they should continue
		B5	135	1 WG member	The groups need to conthinue. They are good, we've learnt a lot and martenal health has improved.
		B5	140	1 WG member	I am happy for the groups they are teaching us a lot about maternal health
		B5	145	1 WG member	The groups are very good, they teach a lot about maternal health and its helping a lot of women.
		B5	155	1 WG member	These are really very good groups, we learn a lot from the groups and we also get entertained at the same time. Apart from being educating we are not benefiting from the groups as we expected.
		B5	175	1 WG member	I learn a lot from these groups especially about martenal health.
		B5	200	2 Non-member in same village	The groups are very educative; promote good health
		B5	220	2 Non-member in same village	I am impressed with the lessons women share on safe motherhood
		B5	250	2 Non-member in same village	Groups very educative
		B5	270	2 Non-member in same village	They teach people actual facts that they have to deliver in hospital
		B5	335	2 Non-member in same village	I would like to join the group since it teach about child bearing so i want to know more
		B5	345	2 Non-member in same village	Its a good group since it teach us much on child bearing, where to deliver as well as attending antenatal clinic
		B5	360	2 Non-member in same village	These groups are teaching us a lot
		B5	475	3 Control area woman	They teach on good mothering ability.
		B5	510	3 Control area woman	They teach good mothering ability
		B6b	145	1 WG member	We stopped believing in witchcraft, now we understand that there are sometimes complications related to pregnancies or child birth.
		B6b	170	1 WG member	One benefits from the views being shared on the group.
		B6b	265	2 Non-member in same village	Its creates awareness to the community.
		F23	10	1 WG member	To improve and maintain what maikhanda has tought us, improve health of our people in our village mostly children
		F23	60	1 WG member	Would like to learn more and encourage fellow women to be meeting
		F23	65	1 WG member	For it to continue teaching people
		F23	150	1 WG member	The group has taught me alot which i didnt knew
		F23	210	2 Non-member in same village	The groups provide a forum for learning
		F23	215	2 Non-member in same village	Group meetings are always educative
		F23	220	2 Non-member in same village	So as to gain more knowledge towards reducing maternal deaths
		F23	245	2 Non-member in same village	So as to gain more knowledge
		F23	250	2 Non-member in same village	More time allocated to groups means more knowledge acquired {tima as consumer rather than producer of group activities)
		F23	260	2 Non-member in same village	For the groups to continue teaching women the good health issues.
		F23	265	2 Non-member in same village	Its a nice organisation so it should sustain since it creates awareness.
		F23	285	2 Non-member in same village	Because they teach us important things on child delivery so I want this to be sustained.
		F23	300	2 Non-member in same village	I want to hear more what they discuss and this may benefit me alot

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
		F23	345	2 Non-member in same village	Because the group is teaching us alot on reduction in matenal and infants deaths as well as horticultural farming. Household care
		F23	355	2 Non-member in same village	To sustain the group. One gains knowledge which she may use in a day to day living
		F23	370	3 Control area woman	To sustain the group so that to teach us alot
		F23	385	3 Control area woman	I want the group to sustain since it may enlight us.
		F23	390	3 Control area woman	We need to learn more about maternal health here.
		F23	405	3 Control area woman	The group is so educative so I want it to be sustained.
		F23	420	3 Control area woman	I personally want the group since it is so educative on family health and planning.
		F23	495	3 Control area woman	It seems that its an educative organisation where I can learn alot so I want it to be sustained.
	(hear what others are discussing)	F23	305	2 Non-member in same village	To hear what my fellow friends are discussing
		F23	310	2 Non-member in same village	To hear more what my friends discuss.
	(Family planning, child spacing)	B5	170	1 WG member	A person who follows child spacing method of family planning can plan for other developments whether family or communal. A person also knows the goodness of delivering a child at the hospital
		B5	285	2 Non-member in same village	They taugh us on child delivery; child spacing; child care and development; prevention of diseases due to proper child spacing.
		B5	320	2 Non-member in same village	Promotes child spacing.
		B5	475	3 Control area woman	Teach on family planning.
		B6b	160	1 WG member	We have learnt about family planning
		F23	275	2 Non-member in same village	Because I want the group to be sustained since it seems to help in creating awareness on motherhood and family planning.
		F23	420	3 Control area woman	I personally want the group since it is so educative on family health and planning
		F23	535	3 Control area woman	This group may teach us alot about child bearing and family planning methods
	(child spacing)	B5	420	3 Control area woman	They teach us on child care and child spacing. {but this women does not go to the group as she is in a control area - is she thinking of another group?}
	(pregnancy nutrition)	B6b	135	1 WG member	They even teach women about good nutrition during pregnancy and breastfeeding
	(HIV prevention)	B6b	200	2 Non-member in same village	Also talk about HIV prevention
	(ANC)	B5	45	1 WG member	The grouups have helped a lot of women to appeciate the importance of going for antenatal clinic
		B5	285	2 Non-member in same village	Encourages women who are pregnant to attend clinics
		B5	315	2 Non-member in same village	They encourages early attending of antenatal clinics.
		B5	370	3 Control area woman	It also encourages women to attend antenal clinics
		B6b	360	2 Non-member in same village	Women now have learnt to startt going for antenal care at an early stage
	(ANC, hospital delivery)	B5	90	1 WG member	The groups are good, they teach us the advantages of going to health facilities when one is pregnant
	(nutition/anaemia)	B5	80	1 WG member	Have realised the goodness of delivering at hospital who can determine whether one is anaemic
	(PNC)	B5	290	2 Non-member in same village	It teaches much on ways of reducing postnatal deaths.
	(child care and development)	B5	285	2 Non-member in same village	They taugh us on child care and development
	Healthy children	F23	10	1 WG member	Improve health of our people in our village mostly children
	Maternal Health	F23	410	3 Control area woman	I am so touched with maternal health issues and i would love to take part in that
	Availability of Healthcare	F23	5	1 WG member	To promote availability of healthcare
	Family Planning	B5	165	1 WG member	Women are using family planning methods.
	Antenatal Care	B5	85	1 WG member	The groups monitor progress during pregnancy and its helping
		B5	105	1 WG member	I like what the groups are doing. Women now go for antenatal clinic
		B5	150	1 WG member	It has helped us alot in delivering at hospital and early attending of antenatal clinic.
		B5	160	1 WG member	These groups are good since they teach us on attending antenatal clinic in time
		B6b	70	1 WG member	Increased attendance at antenatal clinics
	Solidarity/ Encouragement of each other	B5	10	1 WG member	This group is very good it has made women to sit down together and help each other in our village, such that i have nothing negative to say about maikhanda all i see are good things.
	Garden for nutrition	F23	345	2 Non-member in same village	Because the group is teaching us alot on horticultural farming.
	Cleanliness (of homes)	B6b	65	1 WG member	We were taught of the goodness of keeping our homes clean and we are doing that.

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
		B6b	185	2 Non-member in same village	Groups are a source of tips on how to properly manage homes
	Being Patient	F23	345	2 Non-member in same village	Because the group is teaching us alot on Household care
	Being respectful	B6b	5	1 WG member	We avoid some bad behaviours like gosping by attending meetings
	Providing clothing/covering	B6b	75	1 WG member	Incresed awareness on taking good care of expectant mothers by providing them with good clothing/covering in readiness for pregnancy
	Providing transport	B6b	90	1 WG member	They even help on transporting pregnant women to the hospital during labour
		B6b	180	1 WG member	We have been provided with ambulance bicycle to ease transportation of the patients.
		B6b	190	2 Non-member in same village	Provision of the bicycle ambulance has eased transport problems
		B6b	330	2 Non-member in same village	The group uses its funds when pregnant mothers have problems and they carried one woman (a non member) to the hospital when she did not have anyone to help.
	Entertainment	B5	155	1 WG member	we also get entertained at the same time.
	Farming to ensure food security	B6b	270	2 Non-member in same village	They involve themselves in some developmental activities. They also do farming which ensure food security.
		B6b	345	2 Non-member in same village	It also has a horticulture field where the produce are sold to boost the groups account. Some of the produce are given to the expectant mother.
Attitudes of non-members towards MaiKhanda	***Bad***	B5	255	2 Non-member in same village	They are not benefitial to me. There is no nurse and people are delivering from homes. They come back from hospital to deliver at home. {this women not willing to pay}
	Don't know as not involved	B5	205	2 Non-member in same village	I really dont know that much because am not invoved
		B5	540	3 Control area woman	I dont really know about the groups so it is hard to comment on that.
	(but will join)	B5	260	2 Non-member in same village	I have not participated in thier meetings so i do not know if the groups are beneficial or not. But i will join them.
		B5	325	2 Non-member in same village	I planning to join the group but frankly speaking i dont know much so i want see it my self what happens in the group
	Good and want to join	B5	350	2 Non-member in same village	They are very good and i am now thinking of joining.
		B5	535	3 Control area woman	I wish am one of the group members so that am aware of what is shared in the group.
	Good but don't want to join	B5	330	2 Non-member in same village	They are good but i dont feel like joining.
Things to change about WG / problems **B7: Do you think there are problems with the Women's Groups that you have not**	***Poor outcomes of members***	B7b	475	3 Control area woman	Most of them die due to pregnancy related problems.
	More training supplied				
	Need Bicycle ambulance/ Transport	B7b	20	1 WG member	Trasport for pregnant women still pose as a great challenge
		B7b	50	1 WG member	The health centre is still far though we are encouraged to deliver there
		B7b	75	1 WG member	Hospital very far
		B7b	80	1 WG member	Lack of bicycle ambulance for use during emergency
		B7b	100	1 WG member	We asked for some things but we were never helped. E.g bicycle ambulance and drough
		B7b	105	1 WG member	We never got bicycle ambulances like our friends in other groups
		B7b	535	3 Control area woman	There is a problem with transport to the assigned venue
	Need more funding	B7b	135	1 WG member	We do not get enough aid/funds.
		B7b	165	1 WG member	We dont have enough funds and we do not have t-shirts to put on like uniforms.
		B7b	235	2 Non-member in same village	The group lack funding to carter for its needs
	Members to abide by what has been agreed	B7b	170	1 WG member	Failure of some members to abide by what the group has agreed or planned
		B7b	185	2 Non-member in same village	Some women are provocative hence bring confusion to the groups
		B7b	345	2 Non-member in same village	Sometimes misunderstandings may raise resulting into minor conflicts
	Poor participation	B7b	45	1 WG member	Poor participation from few selected individuals
		B7b	65	1 WG member	Women sometimes are not consistent in meetings.
	Others not attending because of ignorance	B7b	40	1 WG member	We still have stubborn people who despite being dicouraged deliver TBAs and shout at us; 'it is not your pregnancy'

THEMES (alternative wording)	SUB-THEMES (Specifics)	CV q.	id	arm	answer
	T-shirts	B7b	165	1 WG member	We dont have enough funds and we do not have t-shirts to put on like uniforms.
F25 You have decided not to pay anything, why did you decide this? Probe for inability to pay or	***Nothing to give (includng time)***	F25	95	1 WG member	I dont have enough to give and since I took over the caring of these twins I am mostly busy
		F25	435	3 Control area woman	I am poor and I can't manage to give any thing. And as I said I am always busy and have limited time
		F25	515	3 Control area woman	I have a lot of children and I am a single parent, and I dont know anything about the groups
		F25	525	3 Control area woman	Am poor
	(doesn't want to be a free rider)	F25	530	3 Control area woman	I do not have anything and it would be difficult to join a group where others are paying something and you are just attending
	No use	F25	255	2 Non-member in same village	Its of no use to me.
	Can't	F25	365	3 Control area woman	I can not join the groups
	Don't know enough about the groups	F25	465	3 Control area woman	I dont know much about the groups so I might decide if the groups come into our area
		F25	505	3 Control area woman	I do not know about the groups and I can't say I can help something I dont know
		F25	515	3 Control area woman	I have a lot of children and I am a single parent, and I dont know anything about the groups
F24: Did you have any problems answering the question on how	***Want to be flexible each month***	F24b	100	1 WG member	I would have loved if i was given the option of giving what is available that month
		F24b	105	1 WG member	We have enough maize to share from harvest time (April) to somewhere in October and after that I can't give out any maize
		F24b	400	3 Control area woman	Because i would have loved if i could be given a chance to give what ever i have that month. E.g. Money this month and flour the other month
		F24b	430	3 Control area woman	I would not give money every month but rather sometime i would give maize flour
	(not sure they can manage every month)	F24b	110	1 WG member	I rarely have anything but i just thought that i can manage to give that much but not on monthly basis
		F24b	115	1 WG member	I would have loved to give maize but sometimes we do not harvest enough and can not sustain giving out. {this respondent was WTP Time}
		F24b	310	2 Non-member in same village	I wasnt sure what I can manage to provide to the group.
	Should be told fixed amount	F24b	120	1 WG member	You could have a fixed amount of how much one should give
	Measurement	F24b	265	2 Non-member in same village	Measurement of the flour.
		F24b	300	2 Non-member in same village	Time estimation was real a problem
	Don't know household expenditure	F24b	285	2 Non-member in same village	We dont keep records on expenditure so I had problems in saying true figures.
		F24b	295	2 Non-member in same village	I don't do any home transactions, even my husband, he ill treats me alot. Most of the things are bought by my parents so much that I dont know how much they spend.
		F24b	305	2 Non-member in same village	I dont know the exact time I took on household chores

Appendix V

Stata code

The following pages contain the Stata (StataCorp, 2011a) .do files used in the data cleaning and analysis for the four empirical sub-studies undertaken as part of this Ph.D., in order: the pilot WHOQoL-BREF validation study (see §3), the main WHOQoL-BREF study comparing quality of life in women's group members, non-members and women in control areas (see §4), the Best-Worst Scaling Discrete Choice Experiments (see §6), and the contingent valuation study (see §7).

```
log using "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/PilotQoL.smcl", replace
****WHOQoL-BREF Pilot study analysis****
insheet using "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/WHOQoL pilot data.txt"
save "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/WHOQoL pilot.dta", replace
cd "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/"

drop in 310/311 //Excel file contains 2 extra blank rows

generate survdate = date(surveydate, "DMYhms")
format survdate %td // date in days
label variable survdate "Survey Date"
drop surveydate

generate d_o_b = date(dob, "DMYhms")
format d_o_b %td // date in days
drop dob
rename d_o_b dob
label variable dob "Date of Birth"

gen agedays = survdate-dob
gen age = agedays/365.26
drop agedays

label define Category 7 "Sick (KCH)" 8 "Healthy (KCH)" 9 "Healthy (village)"
label values category Category
label define Gender 1 "male" 2 "female"
label values gender Gender
label define Education 0 "None" 1 "Primary" 2 "Secondary" 3 "Tertiary"
label values education Education
label define Marital 1 "Single" 2 "Married" 3 "Living as Married" 4 "Separated" 5 "Divorced" 6 "Widowed"
label values maritalstatus Marital
label define YN 0 "No" 1 "Yes"
label values ill YN
label values help YN

recode q3 q4 q26 (1=5) (2=4) (3=3) (4=2) (5=1)
egen nm = rownonmiss(q1-q26)
tab nm

egen phys1 = rowmean(q3 q4 q10 q15 q16 q17 q18)
gen phys2 = phys1*4
egen physNM = rownonmiss(q3 q4 q10 q15 q16 q17 q18)
tab physNM
gen phys = (phys2-4)*(100/16) if physNM>=6 & nm>=21
summ phys
```



```

egen psych1 = rowmean(q5 q6 q7 q11 q19 q26)
gen psych2 = psych1*4
egen psychNM = rownonmiss(q5 q6 q7 q11 q19 q26)
tab psychNM
gen psych = (psych2-4)*(100/16) if psychNM>=5 & nm>=21
summ psych

egen social1 = rowmean(q20 q21 q22)
gen social2 = social1*4
egen socialNM = rownonmiss(q20 q21 q22)
tab socialNM
gen social = (social2-4)*(100/16) if socialNM>=2 & nm>=21
summ social

egen envir1 = rowmean(q8 q9 q12 q13 q14 q23 q24 q25)
gen envir2 = envir1*4
egen envirNM = rownonmiss(q8 q9 q12 q13 q14 q23 q24 q25)
tab envirNM
gen envir = (envir2-4)*(100/16) if envirNM>=6 & nm>=21
summ envir

destring time, gen(time_n) ignore(:) //convert time to number
ttest time_n, by(gender) //does completion time take longer for females - yes p=0.003 but only 2mins

compress
save "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/WHOQoL pilot.dta", replace

*Descriptives
*Table 1
tab category
tab gender
tab education
tab maritalstatus
tab ill
tab illnessenglish
tab help
tabstat ill age, stat(n mean semean) format(%8.3f) longstub
summ age
*Table 3
tabstat phys psych social envir q1 q2, by(category) stat(n min max mean sd skew) format(%8.3f) longstub

*Cronbach's Alpha (different to SPSS - is that because of extra 9 cases though - now sample of 309)
alpha q3 q4 q10 q15 q16 q17 q18, detail item //PHYS
alpha q5 q6 q7 q11 q19 q26, detail item //PSYCH
alpha q20 q21 q22, detail item //SOCIAL
alpha q8 q9 q12 q13 q14 q23 q24 q25, detail item //ENVIR

```

```
*Univariate and Multivariate associations
cd "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/Regressions - pilot QoL"
recode maritalstatus (2=0) // so married becomes the reference category in all regressions
gen age2 = age^2
*Association between depressed and 4 domain scores:
gen depr =.
replace depr=1 if q26==1 | q26==2 | q26==3
replace depr=0 if q26==4 | q26==5
tab depr
//T-tests
ttest phys, by(depr)
ttest psych, by(depr)
ttest social, by(depr)
ttest envir, by(depr)
ttest q1, by(depr)
ttest q2, by(depr)
*New depression analysis - 5 categories, with Never depressed (5) as reference category)
char q26[omit] 5 //make 5 (never depressed) the reference category
xi: regress phys i.q26
xi: regress psych i.q26
xi: regress social i.q26
xi: regress envir i.q26
xi: regress q1 i.q26
xi: regress q2 i.q26
regress phys q26
regress psych q26
regress social q26
regress envir q26
regress q1 q26
regress q2 q26
*Associations between Disability Weights of illness categories and 4 domain scores:
gen dw =.
replace dw=0.09 if illnessenglish=="anaemia"
replace dw=0.75 if illnessenglish=="brain tumor"
replace dw=0.75 if illnessenglish=="cancer"
replace dw=0.75 if illnessenglish=="cervical cancer"
replace dw=0.75 if illnessenglish=="tumor"
replace dw=0.75 if illnessenglish=="tumor in the stomach"
replace dw=0.215 if illnessenglish=="diabetes"
replace dw=0.215 if illnessenglish=="sugar disease (diabetes)"
replace dw=0.191 if illnessenglish=="fever"
replace dw=0.191 if illnessenglish=="malaria"
replace dw=0.439 if illnessenglish=="heart attack"
replace dw=0.246 if illnessenglish=="high blood pressure"
replace dw=0.246 if illnessenglish=="hypertension"
replace dw=0.92 if illnessenglish=="stroke"
replace dw=0.006 if illnessenglish=="boil at the back"
replace dw=0.006 if illnessenglish=="boil on the breast"
```



```
replace dw=0.067 if illnessenglish=="cervical infection"
replace dw=0.191 if illnessenglish=="cold flu"
replace dw=0.006 if illnessenglish=="diarrhoea"
replace dw=0.023 if illnessenglish=="ear infection"
replace dw=0.108 if illnessenglish=="eye infection"
replace dw=0.108 if illnessenglish=="eye problem"
replace dw=0.108 if illnessenglish=="eye problem (can't see)"
replace dw=0.006 if illnessenglish=="intestinal infection"
replace dw=0.104 if illnessenglish=="kidney infection"
replace dw=0.152 if illnessenglish=="measles"
replace dw=0.615 if illnessenglish=="meningitis"
replace dw=0.279 if illnessenglish=="pneumonia"
replace dw=0.279 if illnessenglish=="respiratory system infection"
replace dw=0.07 if illnessenglish=="sore throat"
replace dw=0.07 if illnessenglish=="sores on the throat"
replace dw=0.067 if illnessenglish=="STI"
replace dw=0.067 if illnessenglish=="urinary bladder infection"
replace dw=0.061 if illnessenglish=="backache"
replace dw=0.108 if illnessenglish=="bleeding"
replace dw=0.18 if illnessenglish=="fractured arm"
replace dw=0.271 if illnessenglish=="fractured leg"
replace dw=0.061 if illnessenglish=="hernia"
replace dw=0.104 if illnessenglish=="kidney problem"
replace dw=0.122 if illnessenglish=="pain when passing out urine"
replace dw=0.07 if illnessenglish=="throat sores and general body pains"
replace dw=0.108 if illnessenglish=="wound on thigh"
replace dw=0.043 if illnessenglish=="asthma"
replace dw=0.279 if illnessenglish=="bronchitis"
replace dw=0.279 if illnessenglish=="difficulties in breathing"
replace dw=0.279 if illnessenglish=="difficulty in breathing"
replace dw=0.271 if illnessenglish=="TB"
replace dw=0.024 if illnessenglish=="failure to pass out stool"
replace dw=0.042 if illnessenglish=="ulcers"
replace dw=0.111 if illnessenglish=="Elephantiasis (swollen legs)"
replace dw=0.056 if illnessenglish=="skin disease"
replace dw=0.111 if illnessenglish=="swollen leg"
replace dw=0.111 if illnessenglish=="swollen legs"
replace dw=0 if ill==0 & illnessenglish=="" //not ill (and child not ill) has disability weight of 0
sort dw
tab dw
sort illnessenglish
tab illnessenglish
//Disability weights - without pain=0.082 added (average of low back pain=0.061, sprain=0.064 and Chronic pelvic pain=0.122)
//univariate regressions and then with variables from restr multivariate regression:
regress phys dw
regress phys i.education i.maritalstatus age2 dw
regress psych dw
regress psych i.education i.maritalstatus i.category dw
```

```
regress social dw
regress envir dw
regress envir i.maritalstatus dw
regress q1 dw
regress q1 i.education age age2 dw
regress q2 dw
regress q2 age dw
//Disability weights - WITH pain=0.082 added (average of low back pain=0.061, sprain=0.064 and Chronic pelvic pain=0.122)
replace dw=0.082 if illnessenglish=="abdominal pains"
replace dw=0.082 if illnessenglish=="anal pain"
replace dw=0.082 if illnessenglish=="body pains"
replace dw=0.082 if illnessenglish=="chest pains"
replace dw=0.082 if illnessenglish=="general body pains"
replace dw=0.082 if illnessenglish=="headache"
replace dw=0.082 if illnessenglish=="headache, general body pains and dizziness"
replace dw=0.082 if illnessenglish=="joint pains"
replace dw=0.082 if illnessenglish=="leg-ache"
replace dw=0.082 if illnessenglish=="muscle cramps"
replace dw=0.082 if illnessenglish=="neck stiffness"
replace dw=0.082 if illnessenglish=="pain after operation delivery"
replace dw=0.082 if illnessenglish=="stomach ache"
replace dw=0.082 if illnessenglish=="stomach pains"
sort dw
tab dw
//univariate regressions and then with variables from restr multivariate regression:
regress phys dw
regress phys i.education i.maritalstatus age2 dw
regress psych dw
regress psych i.education i.maritalstatus i.category dw
regress social dw
regress envir dw
regress envir i.maritalstatus dw
regress q1 dw
regress q1 i.education age age2 dw
regress q2 dw
regress q2 age dw

sort id
save "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study paper/WHOQoL pilot.dta", replace

*PHYS
*regress phys age age2 //makes original linear age variable not significant (age2 on it's own is significant like age)
//but age2 is significant in restr1 model unlike age
foreach iv in gender education maritalstatus ill category {
regress phys i.`iv'
estimates store a_`iv'
}
```



```
regress phys age
estimates store a_age
regress phys age2
estimates store a_age2
regress phys i.gender i.education i.maritalstatus i.ill i.category age age2
estimates store a_full
regress phys i.education i.maritalstatus i.ill age2 //Gender and category (collinear) and age are not significant
estimates store a_restr1
regress phys i.education i.maritalstatus age2 //ill not p<0.05 significant
estimates store a_restr2
*Association between q1 and q2 and other domains - add these variables to restr regression models of other 4 domains:
regress phys q1
estimates store a_q1
regress phys q2
estimates store a_q2
regress phys i.education i.maritalstatus age2 q1 q2 //PHYS associated with q1(overall) and q2(health)
estimates store a_restr2_q1q2
//Depr added to socio-demographic restr regression models: ALL HIGHLY SIGNIFICANT NEGATIVE ASSOCIATIONS
regress phys depr
estimates store a_depr
regress phys i.education i.maritalstatus age2 depr
estimates store a_restr2_depr
regress phys q26
estimates store a_q26
regress phys i.education i.maritalstatus age2 q26
estimates store a_restr1_q26
//Disability weights
regress phys dw
estimates store a_dw
regress phys i.education i.maritalstatus age2 dw
estimates store a_restr2_dw
outreg2 [*] using phys_pilot, replace tex(pretty) nocons ti("Physical domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*PSYCH
foreach iv in gender education maritalstatus ill category {
regress psych i.`iv'
estimates store b_`iv'
}
regress psych age
estimates store b_age
regress psych age2
estimates store b_age2
regress psych i.gender i.education i.maritalstatus i.ill i.category
```

```
age age2
estimates store b_full
regress psych i.education i.maritalstatus i.category //Gender, age, age2 and illness are not significant
estimates store b_restr1
regress psych q1
estimates store b_q1
regress psych q2
estimates store b_q2
regress psych i.education i.maritalstatus i.category q1 q2 //PSYCH associated with q1(overall)
estimates store b_restr1_q1q2
regress psych depr
estimates store b_depr
regress psych i.education i.maritalstatus i.category depr
estimates store b_restr1_depr
regress psych q26
estimates store b_q26
regress psych i.education i.maritalstatus i.category q26
estimates store b_restr1_q26
regress psych dw
estimates store b_dw
regress psych i.education i.maritalstatus i.category dw
estimates store b_restr1_dw
outreg2 [*] using psych_pilot, replace tex(pretty) nocons ti("Psychological domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*SOCIAL
foreach iv in gender education maritalstatus ill category {
regress social i.`iv'
estimates store c_`iv'
}
regress social age
estimates store c_age
regress social age2
estimates store c_age2
regress social i.gender i.education i.maritalstatus i.ill i.category age age2
estimates store c_full
regress social i.gender i.education i.maritalstatus age2 //illness, category and age are not p<0.1 significant
estimates store c_restr1
regress social i.gender i.maritalstatus //Education and Age2 are not significant
estimates store c_restr2
regress social i.maritalstatus //Gender is not significant; marital status is also not significantly associated, leaving no variables that are
estimates store c_restr3
regress social q1
```



```
estimates store c_q1
regress social q2
estimates store c_q2
regress social q1 q2 //SOCIAL associated with q1(overall)
estimates store c_restr3_q1q2
regress social depr
estimates store c_depr
regress social q26
estimates store c_q26
regress social dw
estimates store c_dw
outreg2 [*] using social_pilot, replace tex(pretty) nocons ti("Social Relationships domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*ENVIR
foreach iv in gender education maritalstatus ill category {
regress envir i.`iv'
estimates store d_`iv'
}
regress envir age
estimates store d_age
regress envir age2
estimates store d_age2
regress envir i.gender i.education i.maritalstatus i.ill i.category age age2
estimates store d_full
regress envir i.gender i.education i.maritalstatus //illness, category, age and age2 are not p<0.1 significant
estimates store d_restr1
regress envir i.education i.maritalstatus //Gender is not significant
estimates store d_restr2
regress envir i.maritalstatus //Education is not significant
estimates store d_restr3
regress envir q1
estimates store d_q1
regress envir q2
estimates store d_q2
regress envir i.maritalstatus q1 q2 //ENVIR associated with q1(overall)
estimates store d_restr3_q1q2
regress envir depr
estimates store d_depr
regress envir i.maritalstatus depr
estimates store d_restr3_depr
regress envir q26
estimates store d_q26
regress envir i.maritalstatus q26
estimates store d_restr1_q26
regress envir dw
estimates store d_dw
```

```
regress envir i.maritalstatus dw
estimates store d_restr3_dw
outreg2 [*] using envir_pilot, replace tex(pretty) nocons
ti("Environmental domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*Overall
foreach iv in gender education maritalstatus ill category {
regress q1 i.`iv'
estimates store e_`iv'
}
regress q1 age
estimates store e_age
regress q1 age2
estimates store e_age2
regress q1 i.gender i.education i.maritalstatus i.ill i.category age
age2
estimates store e_full
regress q1 i.education age age2 //Gender, Marital Status, illness,
category are not p<0.1 significant
estimates store e_restr1
regress q1 q2
estimates store e_q2
regress q1 i.education age age2 q2 //overall associated with
q2(health)
estimates store e_restr1_q2
regress q1 depr
estimates store e_depr
regress q1 i.education age age2 depr
estimates store e_restr1_depr
regress q1 q26
estimates store e_q26
regress q1 i.education age age2 q26
estimates store e_restr1_q26
regress q1 dw
estimates store e_dw
regress q1 i.education age age2 dw
estimates store e_restr1_dw
outreg2 [*] using q1_pilot, replace tex(pretty) nocons ti("Overall
quality of life domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*Health
foreach iv in gender education maritalstatus ill category {
regress q2 i.`iv'
estimates store f_`iv'
}
regress q2 age
estimates store f_age
regress q2 age2
```



```
estimates store f_age2
regress q2 i.gender i.education i.maritalstatus i.ill i.category age
age2
estimates store f_full
regress q2 i.maritalstatus age //Gender Education, illness, category
are not p<0.1 significant
estimates store f_restr1
regress q2 age //Marital status is not significant (age and age2 are
not significant together)
estimates store f_restr2
regress q2 q1
estimates store f_q2
regress q2 age q1 //health associated with q1(overall)
estimates store f_restr2_q1
regress q2 depr
estimates store f_depr
regress q2 age depr
estimates store f_restr2_depr
regress q2 q26
estimates store f_q26
regress q2 age q26
estimates store f_restr1_q26
regress q2 dw
estimates store f_dw
regress q2 age dw
estimates store f_restr2_dw
outreg2 [*] using q2_pilot, replace tex(pretty) nocons ti("Overall
Health domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

save "/Users/timothycolbourn/Documents/PhD/QoL/WHOQOL/Pilot study
paper/WHOQoL pilot.dta", replace
log close

```

```
log using "/Users/timothycolbourn/Documents/PhD/Data/QoLoutput.smcl", replace
***ANALYSIS OF Quality of Life DATA***
*First need to make the .csv file which is a bit tricky with Excel 2008: had to first save as .xls then from this file save as.csv
*(.txt didn't seem to be working from either .xlsx or .xls)
insheet using "/Users/timothycolbourn/Documents/PhD/Data/Final PhD data for Stata.csv"
cd "/Users/timothycolbourn/Documents/PhD/Data/"
save "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace

*Formats, time variables, Labels and New Variables
generate survdate = date(timestamp, "DMYhms")
format survdate %td // date in days
label variable survdate "Survey Date"
drop timestamp

generate d_o_b = date(dob, "DMYhms")
format d_o_b %td // date in days
drop dob
rename d_o_b dob
label variable dob "Date of Birth"

gen agedays = survdate-dob
gen age = agedays/365.26
drop agedays

gen qolstart = clock(startqol, "DMYhms")
format qolstart %tc
gen qolend = clock(endqol, "DMYhms")
format qolend %tc
gen bwstart = clock(startbw, "DMYhms")
format bwstart %tc
gen bwend = clock(endbw, "DMYhms")
format bwend %tc
gen impstart = clock(startimp, "DMYhms")
format impstart %tc
gen impend = clock(endimp, "DMYhms")
format impend %tc
gen cvstart = clock(startcv, "DMYhms")
format cvstart %tc
gen cvend = clock(endcv, "DMYhms")
format cvend %tc
recast double qolstart qolend bwstart bwend impstart impend cvstart cvend //extra precision necessary as time stored in milliseconds

gen qoltime = qolend - qolstart
format qoltime %tc
gen bwtime = bwend - bwstart
format bwtime %tc
gen imptime = impend - impstart
format imptime %tc
```



```
gen cvtime = cvend - cvstart
format cvtime %tc
egen totaltime = rowtotal(qoltime bwtime imptime cvtime)
format totaltime %tc
recast double qoltime bwtime imptime cvtime totaltime

label define Arm 1 "WG member" 2 "non-member" 3 "Control"
label values arm Arm
label define Edu 0 "None" 1 "Primary Std.1-4" 2 "Primary Std.5-8" 3 "Secondary" 9 "No answer"
label values edu Edu
recode marital (2=0) // so married becomes the reference category in all regressions
label define Marital 1 "Single" 0 "Married" 3 "Living as Married" 4 "Separated" 5 "Divorced" 6 "Widowed"
label values marital Marital
label define YN 0 "No" 1 "Yes"
label values ill YN
label define Literate 0 "Can't read or write" 1 "read only" 2 "write only" 3 "read and write" 9 "No answer"
label values c9 Literate
label define Risk 0 "Low" 1 "High"
label values c10a Literate
label define DelPlace 1 "Village" 2 "TBA" 3 "Health Facility" 4 "Road" 5 "Never delivered"
label values c12 DelPlace
label define PayMethod  1 "Money" 2 "Time" 3 "Maize flour"
label values e14 PayMethod

recode q3 q4 q26 (1=5) (2=4) (3=3) (4=2) (5=1)
egen nm = rownonmiss(q1-q26)
tab nm

egen phys1 = rowmean(q3 q4 q10 q15 q16 q17 q18)
gen phys2 = phys1*4
egen physNM = rownonmiss(q3 q4 q10 q15 q16 q17 q18)
tab physNM
gen phys = (phys2-4)*(100/16) if physNM>=6 & nm>=21
summ phys
bys arm: summ phys

egen psych1 = rowmean(q5 q6 q7 q11 q19 q26)
gen psych2 = psych1*4
egen psychNM = rownonmiss(q5 q6 q7 q11 q19 q26)
tab psychNM
gen psych = (psych2-4)*(100/16) if psychNM>=5 & nm>=21
summ psych
bys arm: summ psych

egen social1 = rowmean(q20 q21 q22)
gen social2 = social1*4
egen socialNM = rownonmiss(q20 q21 q22)
```

```
tab socialNM
gen social = (social2-4)*(100/16) if socialNM>=2 & nm>=21
summ social
bys arm: summ social

egen envir1 = rowmean(q8 q9 q12 q13 q14 q23 q24 q25)
gen envir2 = envir1*4
egen envirNM = rownonmiss(q8 q9 q12 q13 q14 q23 q24 q25)
tab envirNM
gen envir = (envir2-4)*(100/16) if envirNM>=6 & nm>=21
summ envir
bys arm: summ envir

gen wgnon=.
replace wgnon=1 if arm==1
replace wgnon=2 if arm==2
gen wgcontrol=.
replace wgcontrol=1 if arm==1
replace wgcontrol=3 if arm==3
gen noncontrol=.
replace noncontrol=2 if arm==2
replace noncontrol=3 if arm==3
label values (wgnon wgcontrol noncontrol) Arm

gen cluster=. //for random effects regression (xtreg)
replace cluster=1 if (id>=1 & id<=5) | (id>=181 & id<=185)
replace cluster=2 if (id>=6 & id<=10) | (id>=186 & id<=190)
replace cluster=3 if (id>=11 & id<=15) | (id>=191 & id<=195)
replace cluster=4 if (id>=16 & id<=20) | (id>=196 & id<=200)
replace cluster=5 if (id>=21 & id<=25) | (id>=201 & id<=205)
replace cluster=6 if (id>=26 & id<=30) | (id>=206 & id<=210)
replace cluster=7 if (id>=31 & id<=35) | (id>=211 & id<=215)
replace cluster=8 if (id>=36 & id<=40) | (id>=216 & id<=220)
replace cluster=9 if (id>=41 & id<=45) | (id>=221 & id<=225)
replace cluster=10 if (id>=46 & id<=50) | (id>=226 & id<=230)
replace cluster=11 if (id>=51 & id<=55) | (id>=231 & id<=235)
replace cluster=12 if (id>=56 & id<=60) | (id>=236 & id<=240)
replace cluster=13 if (id>=61 & id<=65) | (id>=241 & id<=245)
replace cluster=14 if (id>=66 & id<=70) | (id>=246 & id<=250)
replace cluster=15 if (id>=71 & id<=75) | (id>=251 & id<=255)
replace cluster=16 if (id>=76 & id<=80) | (id>=256 & id<=260)
replace cluster=17 if (id>=81 & id<=85) | (id>=261 & id<=265)
replace cluster=18 if (id>=86 & id<=90) | (id>=266 & id<=270)
replace cluster=19 if (id>=91 & id<=95) | (id>=271 & id<=275)
replace cluster=20 if (id>=96 & id<=100) | (id>=276 & id<=280)
replace cluster=21 if (id>=101 & id<=105) | (id>=281 & id<=285)
replace cluster=22 if (id>=106 & id<=110) | (id>=286 & id<=290)
replace cluster=23 if (id>=111 & id<=115) | (id>=291 & id<=295)
replace cluster=24 if (id>=116 & id<=120) | (id>=296 & id<=300)
replace cluster=25 if (id>=121 & id<=125) | (id>=301 & id<=305)
replace cluster=26 if (id>=126 & id<=130) | (id>=306 & id<=310)
replace cluster=27 if (id>=131 & id<=135) | (id>=311 & id<=315)
```



```
replace cluster=28 if (id>=136 & id<=140) | (id>=316 & id<=320)
replace cluster=29 if (id>=141 & id<=145) | (id>=321 & id<=325)
replace cluster=30 if (id>=146 & id<=150) | (id>=326 & id<=330)
replace cluster=31 if (id>=151 & id<=155) | (id>=331 & id<=335)
replace cluster=32 if (id>=156 & id<=160) | (id>=336 & id<=340)
replace cluster=33 if (id>=161 & id<=165) | (id>=341 & id<=345)
replace cluster=34 if (id>=166 & id<=170) | (id>=346 & id<=350)
replace cluster=35 if (id>=171 & id<=175) | (id>=351 & id<=355)
replace cluster=36 if (id>=176 & id<=180) | (id>=356 & id<=360)
replace cluster=37 if (id>=361 & id<=365)
replace cluster=38 if (id>=366 & id<=370)
replace cluster=39 if (id>=371 & id<=375)
replace cluster=40 if (id>=376 & id<=380)
replace cluster=41 if (id>=381 & id<=385)
replace cluster=42 if (id>=386 & id<=390)
replace cluster=43 if (id>=391 & id<=395)
replace cluster=44 if (id>=396 & id<=400)
replace cluster=45 if (id>=401 & id<=405)
replace cluster=46 if (id>=406 & id<=410)
replace cluster=47 if (id>=411 & id<=415)
replace cluster=48 if (id>=416 & id<=420)
replace cluster=49 if (id>=421 & id<=425)
replace cluster=50 if (id>=426 & id<=430)
replace cluster=51 if (id>=431 & id<=435)
replace cluster=52 if (id>=436 & id<=440)
replace cluster=53 if (id>=441 & id<=445)
replace cluster=54 if (id>=446 & id<=450)
replace cluster=55 if (id>=451 & id<=455)
replace cluster=56 if (id>=456 & id<=460)
replace cluster=57 if (id>=461 & id<=465)
replace cluster=58 if (id>=466 & id<=470)
replace cluster=59 if (id>=471 & id<=475)
replace cluster=60 if (id>=476 & id<=480)
replace cluster=61 if (id>=481 & id<=485)
replace cluster=62 if (id>=486 & id<=490)
replace cluster=63 if (id>=491 & id<=495)
replace cluster=64 if (id>=496 & id<=500)
replace cluster=65 if (id>=501 & id<=505)
replace cluster=66 if (id>=506 & id<=510)
replace cluster=67 if (id>=511 & id<=515)
replace cluster=68 if (id>=516 & id<=520)
replace cluster=69 if (id>=521 & id<=525)
replace cluster=70 if (id>=526 & id<=530)
replace cluster=71 if (id>=531 & id<=535)
replace cluster=72 if (id>=536 & id<=540)

gen user=.
replace user=1 if username=="Zione"
replace user=2 if username=="George"
replace user=3 if username=="Bryan"
replace user=4 if username=="Meya"
replace user=5 if username=="Lusayo"
```

```
label define User 1 "Zione" 2 "George" 3 "Bryan" 4 "Meya" 5 "Lusayo"
label values user User

compress
save "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace

***WHOQoL-BREF analysis
*Demographics and QoL domain results of each arm
tab arm
tab edu arm, col
tab marital arm, col
tab ill arm, col
tabstat ill age, by(arm) stat(n mean semean) format(%8.3f) longstub
tab user arm, col
tabstat phys psych social envir q1 q2, by(arm) stat(n mean semean)
format(%8.3f) longstub
*QoL domain score histograms by arm
histogram phys, freq by(arm) ylabel(0(10)30) xlabel(0(20)100)
xtitle("Physical domain score") ///
    by(, title("Distribution of Physical domain scores by arm",
size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_phys_dist_arm.gph", replace
histogram psych, freq by(arm) ylabel(0(10)30) xlabel(0(20)100)
xtitle("Psychological domain score") ///
    by(, title("Distribution of Psychological domain scores by arm",
size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_psych_dist_arm.gph", replace
histogram social, freq by(arm) ylabel(0(10)30) xlabel(0(20)100)
xtitle("Social Relationships domain score") ///
    by(, title("Distribution of Social Relationships domain scores
by arm", size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_social_dist_arm.gph", replace
histogram envir, freq by(arm) ylabel(0(10)30) xlabel(0(20)100)
xtitle("Environmental domain score") ///
    by(, title("Distribution of Environmental domain scores by arm",
size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_envir_dist_arm.gph", replace
histogram q1, freq by(arm) ylabel(0(20)100) xlabel(1(1)5)
xtitle("Overall QoL question score") ///
    by(, title("Distribution of Overall QoL question scores by arm",
size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_overall_dist_arm.gph", replace
histogram q2, freq by(arm) ylabel(0(20)100) xlabel(1(1)5)
xtitle("Health question score") ///
    by(, title("Distribution of Health question scores by arm",
size(small)) note(""))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
```



```
QoL_health_dist_arm.gph", replace

*T-Tests + saving results for graphs
gen stat =.
set obs 555
replace arm = 1 in 535/541
replace arm = 2 in 542/548
replace arm = 3 in 549/555
replace stat = 1 in 535
replace stat = 2 in 536
replace stat = 3 in 537
replace stat = 4 in 538
replace stat = 5 in 539
replace stat = 6 in 540
replace stat = 7 in 541
replace stat = 1 in 542
replace stat = 2 in 543
replace stat = 3 in 544
replace stat = 4 in 545
replace stat = 5 in 546
replace stat = 6 in 547
replace stat = 7 in 548
replace stat = 1 in 549
replace stat = 2 in 550
replace stat = 3 in 551
replace stat = 4 in 552
replace stat = 5 in 553
replace stat = 6 in 554
replace stat = 7 in 555
label define Stat 1 "mean" 2 "lower95%" 3 "upper95%" 4 "se mean" 5
"p wgnon" 6 "p wgcontrol" 7 "p noncontrol"
label values stat Stat

foreach f in phys psych social envir q1 q2 q3 q4 q5 q6 q7 q8 q9 q10
q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
{
    summ `f' if arm==1
    gen `f'_ =.
    replace `f'_ = scalar(r(mean)) in 535
    replace `f'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 538
    replace `f'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 536
    replace `f'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 537
    ttest `f', by(wgnon)
    replace `f'_ = scalar(r(p)) in 539
    ttest `f', by(wgcontrol)
    replace `f'_ = scalar(r(p)) in 540
    ttest `f', by(noncontrol)
    replace `f'_ = scalar(r(p)) in 541
}
foreach g in phys psych social envir q1 q2 q3 q4 q5 q6 q7 q8 q9 q10
```

```
q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
{
    summ `g' if arm==2
    replace `g'_ = scalar(r(mean)) in 542
    replace `g'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 545
    replace `g'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 543
    replace `g'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 544
    ttest `g', by(wgnon)
    replace `g'_ = scalar(r(p)) in 546
    ttest `g', by(wgcontrol)
    replace `g'_ = scalar(r(p)) in 547
    ttest `g', by(noncontrol)
    replace `g'_ = scalar(r(p)) in 548
}
foreach h in phys psych social envir q1 q2 q3 q4 q5 q6 q7 q8 q9 q10
q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
{
    summ `h' if arm==3
    replace `h'_ = scalar(r(mean)) in 549
    replace `h'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 552
    replace `h'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 550
    replace `h'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 551
    ttest `h', by(wgnon)
    replace `h'_ = scalar(r(p)) in 553
    ttest `h', by(wgcontrol)
    replace `h'_ = scalar(r(p)) in 554
    ttest `h', by(noncontrol)
    replace `h'_ = scalar(r(p)) in 555
}

keep in 535/555
keep arm stat phys_-q27_
label variable q1_ "1. overall QoL"
label variable q2_ "2. Health"
label variable q3_ "3. Pain"
label variable q4_ "4. Medicine"
label variable q5_ "5. Enjoyment"
label variable q6_ "6. Life meaning"
label variable q7_ "7. Concentration"
label variable q8_ "8. Security"
label variable q9_ "9. Envir. healthy"
label variable q10_ "10. Energy"
label variable q11_ "11. Appearance"
label variable q12_ "12. Money"
label variable q13_ "13. Information"
label variable q14_ "14. Leisure"
label variable q15_ "15. Mobility"
label variable q16_ "16. Sleep"
```



```
label variable q17_ "17. Daily activities"
label variable q18_ "18. Work capacity"
label variable q19_ "19. Self satisfaction"
label variable q20_ "20. Relationships"
label variable q21_ "21. Sex life"
label variable q22_ "22. Support"
label variable q23_ "23. Living conditions"
label variable q24_ "24. Health serv. access"
label variable q25_ "25. Transport"
label variable q26_ "26. Depression"
label variable q27_ "27. Food enough"
compress
save "/Users/timothycolbourn/Documents/PhD/Data/QoL_ttest.dta",
replace

graph box phys_ psych_ social_ envir_ if stat==1 | stat==2 |
stat==3, over(arm) ytitle(Domain score (0-100 scale)) ///
title("Quality of life domain scores (mean and 95%CI) by arm",
size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_domain_arm.gph", replace
*note("p-value of WG vs. non member = "`=phys_ in 5')

graph box q1_ q2_ if stat==1 | stat==2 | stat==3, over(arm)
ytitle(Domain score (1-5 scale)) ylabel(1(1)5) ///
title("Quality of life domain scores (mean and 95%CI) by arm",
size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_overall_arm.gph", replace

graph box q3_ q4_ q10_ q15_ q16_ q17_ q18_ q27_ if stat==1 | stat==2
| stat==3, over(arm) ytitle(Facet score (1-5 scale))
ylabel(1(1)5) ///
title("Physical domain facet scores (mean and 95%CI) by arm",
size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_phys_q_arm.gph", replace

graph box q5_ q6_ q7_ q11_ q19_ q26_ if stat==1 | stat==2 | stat==3,
over(arm) ytitle(Facet score (1-5 scale)) ylabel(1(1)5) ///
title("Psychological domain facet scores (mean and 95%CI) by arm",
size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_psych_q_arm.gph", replace

graph box q20_ q21_ q22_ if stat==1 | stat==2 | stat==3, over(arm)
ytitle(Facet score (1-5 scale)) ylabel(1(1)5) ///
title("Social Relationships domain facet scores (mean and 95%CI) by
arm", size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/
QoL_social_q_arm.gph", replace

```

```
graph box q8_ q9_ q12_ q13_ q14_ q23_ q24_ q25_ if stat==1 | stat==2 | stat==3, over(arm) ytitle(Facet score (1-5 scale)) ylabel(1(1)5) ///
title("Environmental domain facet scores (mean and 95%CI) by arm", size(small))
graph save "/Users/timothycolbourn/Documents/PhD/Data/QoL_envir_q_arm.gph", replace

*Regressions - Univariate, then multivariate combinations
use "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
cd "/Users/timothycolbourn/Documents/PhD/Data/Regressions"
*PHYS
foreach iv in arm edu marital ill user {
regress phys i.`iv'
estimates store a_`iv'
}
regress phys ib(3).arm
estimates store a_refwg
regress phys age
estimates store a_age
regress phys i.arm i.edu i.marital i.ill age
estimates store a_full
regress phys i.arm i.marital i.ill //Education and Age not significant
estimates store a_restr
regress phys i.arm i.edu i.marital i.ill age i.user
estimates store a_full_user
regress phys i.arm i.user
estimates store a_arm_user
regress phys i.arm i.marital i.ill i.user
estimates store a_restr_user
outreg2 [*] using phys, replace tex(pretty) nocons ti("Physical domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*PSYCH
foreach iv in arm edu marital ill user {
regress psych i.`iv'
estimates store b_`iv'
}
regress psych ib(3).arm
estimates store b_refwg
regress psych age
estimates store b_age
regress psych i.arm i.edu i.marital i.ill age
estimates store b_full
regress psych i.arm i.edu i.marital i.ill //Age not significant
estimates store b_restr
regress psych i.arm i.edu i.marital i.ill age i.user
estimates store b_full_user
regress psych i.arm i.user
estimates store b_arm_user
```



```
regress psych i.arm i.edu i.marital i.ill i.user
estimates store b_restr_user
outreg2 [*] using psych, replace tex(pretty) nocons ti("Psychology domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*SOCIAL
foreach iv in arm edu marital ill user {
regress social i.`iv'
estimates store c_`iv'
}
regress social ib(3).arm
estimates store c_refwg
regress social age
estimates store c_age
regress social i.arm i.edu i.marital i.ill age
estimates store c_full
regress social i.arm i.marital i.ill //Education and Age not significant
estimates store c_restr
regress social i.arm i.edu i.marital i.ill age i.user
estimates store c_full_user
regress social i.arm i.user
estimates store c_arm_user
regress social i.arm i.marital i.ill i.user
estimates store c_restr_user
outreg2 [*] using social, replace tex(pretty) nocons ti("Social Relationships domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*ENVIR
foreach iv in arm edu marital ill user {
regress envir i.`iv'
estimates store d_`iv'
}
regress envir ib(3).arm
estimates store d_refwg
regress envir age
estimates store d_age
regress envir i.arm i.edu i.marital i.ill age
estimates store d_full
regress envir i.arm i.marital i.ill //Education and Age not significant
estimates store d_restr
regress envir i.arm i.edu i.marital i.ill age i.user
estimates store d_full_user
regress envir i.arm i.user
estimates store d_arm_user
regress envir i.arm i.marital i.ill i.user
estimates store d_restr_user
outreg2 [*] using envir, replace tex(pretty) nocons ti("Environmental domain Regressions") ///
```

```
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Overall
foreach iv in arm edu marital ill user {
regress q1 i.`iv'
estimates store e_`iv'
}
regress q1 ib(3).arm
estimates store e_refwg
regress q1 age
estimates store e_age
regress q1 i.arm i.edu i.marital i.ill age
estimates store e_full
regress q1 i.arm i.marital i.ill //Education and Age not significant
estimates store e_restr
regress q1 i.arm i.edu i.marital i.ill age i.user
estimates store e_full_user
regress q1 i.arm i.user
estimates store e_arm_user
regress q1 i.arm i.marital i.ill i.user
estimates store e_restr_user
outreg2 [*] using q1, replace tex(pretty) nocons ti("Overall Quality
of Life domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Health
foreach iv in arm edu marital ill user {
regress q2 i.`iv'
estimates store f_`iv'
}
regress q2 ib(3).arm
estimates store f_refwg
regress q2 age
estimates store f_age
regress q2 i.arm i.edu i.marital i.ill age
estimates store f_full
//Secondary education is p=0.049 significant and all other variables
are significant
// therefore full model can be said to be the restricted model.
regress q2 i.arm i.edu i.marital i.ill age i.user
estimates store f_full_user
regress q2 i.arm i.user
estimates store f_arm_user
regress q2 i.arm i.marital i.ill i.user
estimates store f_restr_user
outreg2 [*] using q2, replace tex(pretty) nocons ti("Health domain
Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

*Investigation of effects of different interviewers (users)
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD.dta"
```



```
foreach m in phys psych social envir q1 q2 {
    foreach n in 1 2 3 {
        regress `m' i.user if arm==`n'
        estimates store `m'_user_`n'
    }
}
outreg2 [*] using user, replace tex(land pretty) nocons
ti("Interviewer Regressions - Domains scores within each arm (1=WG
2=non-members  3=control") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
foreach o in phys psych social envir q1 q2 {
    foreach p in 1 2 3 4 5 {
        regress `o' i.arm if user==`p'
    }
}

*Random effects by cluster (village) - Univariate, then multivariate
combinations
xtset cluster
*PHYS - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg phys i.`iv', re
estimates store g_`iv'
}
xtreg phys age, re
estimates store g_age
xtreg phys i.arm i.edu i.marital i.ill age, re
estimates store g_full
xtreg phys i.arm i.marital i.ill, re //Education and Age not
significant
estimates store g_restr
xtreg phys i.arm i.edu i.marital i.ill age i.user, re
estimates store g_full_user
xtreg phys i.arm i.user, re
estimates store g_arm_user
xtreg phys i.arm i.marital i.ill i.user, re
estimates store g_restr_user
outreg2 [*] using phys_clus, replace tex(pretty) nocons ti("Physical
domain Regressions - Random effects by village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*PSYCH - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg psych i.`iv', re
estimates store h_`iv'
}
xtreg psych age, re
estimates store h_age
xtreg psych i.arm i.edu i.marital i.ill age, re
estimates store h_full
xtreg psych i.arm i.edu i.marital i.ill, re //Age not significant
```

```
estimates store h_restr
xtreg psych i.arm i.edu i.marital i.ill age i.user, re
estimates store h_full_user
xtreg psych i.arm i.user, re
estimates store h_arm_user
xtreg psych i.arm i.edu i.marital i.ill i.user, re
estimates store h_restr_user
outreg2 [*] using psych_clus, replace tex(pretty) nocons
ti("Psychology domain Regressions - Random effects by village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*SOCIAL - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg social i.`iv', re
estimates store i_`iv'
}
xtreg social age, re
estimates store i_age
xtreg social i.arm i.edu i.marital i.ill age, re
estimates store i_full
xtreg social i.arm i.marital i.ill, re //Education and Age not
significant
estimates store i_restr
xtreg social i.arm i.edu i.marital i.ill age i.user, re
estimates store i_full_user
xtreg social i.arm i.user, re
estimates store i_arm_user
xtreg social i.arm i.marital i.ill i.user, re
estimates store i_restr_user
outreg2 [*] using social_clus, replace tex(pretty) nocons ti("Social
Relationships domain Regressions - Random effects by village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*ENVIR - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg envir i.`iv', re
estimates store j_`iv'
}
xtreg envir age, re
estimates store j_age
xtreg envir i.arm i.edu i.marital i.ill age, re
estimates store j_full
xtreg envir i.arm i.marital i.ill, re //Education and Age not
significant
estimates store j_restr
xtreg envir i.arm i.edu i.marital i.ill age i.user, re
estimates store j_full_user
xtreg envir i.arm i.user, re
estimates store j_arm_user
xtreg envir i.arm i.marital i.ill i.user, re
estimates store j_restr_user
outreg2 [*] using envir_clus, replace tex(pretty) nocons
```



```
ti("Environmental domain Regressions - Random effects by
village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Overall - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg q1 i.`iv', re
estimates store k_`iv'
}
xtreg q1 age, re
estimates store k_age
xtreg q1 i.arm i.edu i.marital i.ill age, re
estimates store k_full
xtreg q1 i.arm i.marital i.ill, re //Education and Age not
significantl
estimates store k_restr
xtreg q1 i.arm i.edu i.marital i.ill age i.user, re
estimates store k_full_user
xtreg q1 i.arm i.user, re
estimates store k_arm_user
xtreg q1 i.arm i.marital i.ill i.user, re
estimates store k_restr_user
outreg2 [*] using q1_clus, replace tex(pretty) nocons ti("Overall
Quality of Life domain Regressions - Random effects by village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Health - Cluster Random Effects
foreach iv in arm edu marital ill user {
xtreg q2 i.`iv', re
estimates store l_`iv'
}
xtreg q2 age, re
estimates store l_age
xtreg q2 i.arm i.edu i.marital i.ill age, re
estimates store l_full
xtreg q2 i.arm i.marital i.ill, re //Education and Age not
significantl
estimates store l_restr
xtreg q2 i.arm i.edu i.marital i.ill age i.user, re
estimates store l_full_user
xtreg q2 i.arm i.user, re
estimates store l_arm_user
xtreg q2 i.arm i.marital i.ill i.user, re
estimates store l_restr_user
outreg2 [*] using q2_clus, replace tex(pretty) nocons ti("Health
domain Regressions - Random effects by village") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
//Random effects regressions generally have similar results to basic
regressions not accounting for clustering:
//p-values only vary typically by a few % or less
cd "/Users/timothycolbourn/Documents/PhD/Data/"
```

```
save "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
log close

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive/FertCorro.smcl", replace
****FERTILE FUNCTIONINGS AND CORROSIVE DISADVANTAGES**
***Univariate
*Main study dataset
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD.dta"
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive"
foreach r in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
    foreach q in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
        regress q`r' q`q'
        estimates store f_q`r'_`q'
    }
    outreg2 [*] using ff`r', replace tex(pretty) nocons ti("Correlations between quality of life facets") ///
        label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
    estimates clear
}
//please note that the estimates store command will not work if it is too long (in this case the two digits of the q no. caused an error so I deleted an f from ff
//also have to include the estimates clear (and outreg to tex) after each loop to make sure it doesn't overload
*Pilot study dataset
use "/Users/timothycolbourn/Dropbox/Tim's PhD/QoL/WHOQOL/Pilot study paper/WHOQoL pilot.dta"
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive"
foreach r in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
    foreach q in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
        regress q`r' q`q'
        estimates store p_q`r'_`q'
    }
    outreg2 [*] using pff`r', replace tex(pretty) nocons ti("Correlations between quality of life facets") ///
        label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
    estimates clear
}
*Combined pilot and main study dataset
rename education edu
rename maritalstatus marital
append using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD.dta", keep(id edu marital ill q1 q2 q3 ///
q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27 ///
```



```
dob age user phys psych social envir) force
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive"
gen study=.
replace study=0 if _n>=0 & _n<=309
replace study=1 if _n>=310 & _n<=843
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive/WHOQoL_pilot_main.dta", replace
foreach r in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
    foreach q in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
        regress q`r' q`q'
        estimates store c_q`r'_`q'
    }
    outreg2 [*] using cff`r', replace tex(pretty) nocons ti("Correlations between quality of life facets") ///
        label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
    estimates clear
}
log close //copy each set of the 27 sets of q1-q27 regressions seperately to Excel from this log file by right clicking and choosing 'Copy Table'
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Fertile and Corrosive/FertCorro_Mult_sem.smcl", replace
***Multivariate
*Main Study
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD.dta", replace
xi: stepwise, pr(.05): regress q1 i.edu i.marital i.ill age age2 i.user q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q1_
xi: stepwise, pr(.05): regress q2 i.edu i.marital i.ill age age2 i.user q1 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q2_
xi: stepwise, pr(.05): regress q3 i.edu i.marital i.ill age age2 i.user q1 q2 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q3_
xi: stepwise, pr(.05): regress q4 i.edu i.marital i.ill age age2 i.user  q1 q2 q3 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q4_
xi: stepwise, pr(.05): regress q5 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q5_
xi: stepwise, pr(.05): regress q6 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
```

```
estimates store q6_
xi: stepwise, pr(.05): regress q7 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q7_
xi: stepwise, pr(.05): regress q8 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q8_
xi: stepwise, pr(.05): regress q9 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q9_
xi: stepwise, pr(.05): regress q10 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q10_
xi: stepwise, pr(.05): regress q11 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q11_
xi: stepwise, pr(.05): regress q12 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q12_
xi: stepwise, pr(.05): regress q13 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q13_
xi: stepwise, pr(.05): regress q14 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q14_
xi: stepwise, pr(.05): regress q15 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q15_
xi: stepwise, pr(.05): regress q16 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q16_
xi: stepwise, pr(.05): regress q17 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q17_
xi: stepwise, pr(.05): regress q18 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q19 q20 q21 q22 q23 q24 q25 q26 q27
estimates store q18_
xi: stepwise, pr(.05): regress q19 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q20 q21 q22 q23 q24 q25 q26 q27
```



```
estimates store q19_
xi: stepwise, pr(.05): regress q20 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q21 q22 q23 q24 q25 q26 q27
estimates store q20_
xi: stepwise, pr(.05): regress q21 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q22 q23 q24 q25 q26 q27
estimates store q21_
xi: stepwise, pr(.05): regress q22 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q23 q24 q25 q26 q27
estimates store q22_
xi: stepwise, pr(.05): regress q23 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q24 q25 q26 q27
estimates store q23_
xi: stepwise, pr(.05): regress q24 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q25 q26 q27
estimates store q24_
xi: stepwise, pr(.05): regress q25 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q26 q27
estimates store q25_
xi: stepwise, pr(.05): regress q26 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q27
estimates store q26_
xi: stepwise, pr(.05): regress q27 i.edu i.marital i.ill age age2 i.user q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26
estimates store q27_
outreg2 [*] using ffmult2, replace tex(pretty) nocons ti("Multivariate regressions of quality of life facets with each other and socio-demographic variables") ///
        label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
//these variables were generated because SEM does not take factor variables
//For each variable 0 does not just code the reference level (as in the dummy coding in the multivariate regressions above)
//This was to maintain high enough sample sizes for the SEM
gen edu1=.
replace edu1 = 1 if edu==1
replace edu1 = 0 if edu==0 | edu==2 | edu==3 | edu==9
gen edu2=.
replace edu2 = 1 if edu==2
replace edu2 = 0 if edu==0 | edu==1 | edu==3 | edu==9
gen edu3=.
replace edu3 = 1 if edu==3
replace edu3 = 0 if edu==0 | edu==1 | edu==2 | edu==9
```

```
gen edu9=.
replace edu9 = 1 if edu==9
replace edu9 = 0 if edu==0 | edu==1 | edu==2 | edu==3
gen marital1=.
replace marital1 = 1 if marital==1
replace marital1 = 0 if marital==0 | marital==2 | marital==3 | marital==4 | marital==5 | marital==6
gen marital3=.
replace marital3 = 1 if marital==3
replace marital3 = 0 if marital==0 | marital==2 | marital==1 | marital==4 | marital==5 | marital==6
gen marital4=.
replace marital4 = 1 if marital==4
replace marital4 = 0 if marital==0 | marital==2 | marital==1 | marital==3 | marital==5 | marital==6
gen marital5=.
replace marital5 = 1 if marital==5
replace marital5 = 0 if marital==0 | marital==2 | marital==1 | marital==3 | marital==4 | marital==6
gen marital6=.
replace marital6 = 1 if marital==6
replace marital6 = 0 if marital==0 | marital==2 | marital==1 | marital==3 | marital==4 | marital==5
gen user2=.
replace user2 = 1 if user==2
replace user2 = 0 if user==1 | user==3 | user==4 | user==5
gen user3=.
replace user3 = 1 if user==3
replace user3 = 0 if user==1 | user==2 | user==4 | user==5
gen user4=.
replace user4 = 1 if user==4
replace user4 = 0 if user==1 | user==2 | user==3 | user==5
gen user5=.
replace user5 = 1 if user==5
replace user5 = 0 if user==1 | user==2 | user==3 | user==4
//Structural Equation model including all of the significant pathways from the 27 separate multivariate regressions estimated above
sem (edu3 marital3 ill user2 user3 user4 q10 q16 q17 q5 q2 -> q1) (marital1 ill age2 user3 q10 q5 q26 q1 -> q2) ///
(ill user2 user5 q4 q17 q11 q19 q26 -> q3) (marital1 ill user2 user4 user5 q3 q10 q18 q7 q11 q14 -> q4) ///
(marital3 age age2 user2 q18 q6 q21 q8 q9 q12 q1 q2 -> q5) (user3 q4 q16 q5 q7 q19 q8 q13 q24 -> q6) ///
(edu2 edu3 user2 user3 user5 q10 q16 q6 q21 q8 q9 q14 -> q7) (user2 q4 q17 q5 q6 q7 q9 q2 -> q8) ///
(marital3 marital6 q10 q16 q18 q5 q7 q20 q22 q8 q23 -> q9) (age2 q4 q17 q7 q11 q9 q24 q2 -> q10) ///
(user2 user3 q3 q4 q10 q19 q27 -> q11) (age2 user3 user4 user5 q15 q26 q22 q13 q27 -> q12) ///
(age age2 user2 q6 q19 q12 q14 q24 -> q13) (edu1 edu2 age age2 user2 user3 q4 q17 q7 q19 q22 q13 -> q14) ///
```



```
(q17 q19 q12 q25 q27 -> q15) (marital4 q17 q6 q19 q26 q21 q9 q25 q1 -> q16) ///
(q10 q16 q18 q7 q27 -> q17) (age user4 q4 q17 q5 q19 -> q18) ///
(edu9 marital6 q3 q4 q15 q16 q18 q6 q11 q20 q21 -> q19) (marital3 ill age2 user2 q17 q19 q22 q9 -> q20) ///
(marital4 marital5 marital6 user5 q16 q5 q7 q19 q26 q22 q23 -> q21) (user2 q26 q20 q21 q12 q24 q25 -> q22) ///
(marital5 age user3 q18 q11 q21 q22 q9 q24 q27 q2 -> q23) (marital5 q10 q15 q6 q21 q22 q13 q23 q25 -> q24) ///
(age age2 user2 user4 q3 q15 q16 q22 q23 q24 -> q25) (edu9 age2 user4 q3 q6 q21 q22 q12 q27 -> q26) ///
(edu1 edu2 edu3 user2 user3 q15 q17 q11 q26 q12 q23 -> q27)
estat gof, stats(all) //Model has got p=0.5 which is good - fits data well
estat stable //Stable
estat framework, standardized
estat mindices //don't need to add anymore pathways
estat teffects //direct, indirect and total effects
//Take out the pathways that are not significant in the above model:
sem (edu3 marital3 ill user2 user3 user4 q10 q17 q5 q2 -> q1) (marital1 ill age2 q10 q5 q26 -> q2) ///
(ill user2 user5 q4 q17 -> q3) (ill user2 user4 user5 -> q4) ///
(marital3 age age2 q12 q2 -> q5) (user3 q5 q24 -> q6) ///
(edu2 edu3 user2 user3 user5 q10 -> q7) (q4 q9 -> q8) ///
(marital3 marital6 q10 q16 q5 -> q9) (age2 q4 q17 q11 -> q10) ///
(user3 q19 q27 -> q11) (age2 user3 user4 user5 q13 q27 -> q12) ///
(user2 q12 -> q13) (edu2 age age2 user3 q17 q19 q13 -> q14) ///
(q17 q19 q27 -> q15) (q17 q19 q26 q1 -> q16) ///
(q18 q7 -> q17) (age user4 q4 q5 -> q18) ///
(marital6 q15 q16 q18 q11 -> q19) (marital3 ill age2 user2 q17 q22 -> q20) ///
(marital4 marital5 marital6 -> q21) (q24 q25 -> q22) ///
(marital5 q18 q11 q21 q9 q2 -> q23) (q10 q13 -> q24) ///
(age age2 user2 user4 q3 q15 q16 q24 -> q25) (edu9 user4 q3 q21 q22 q27 -> q26) ///
(edu1 edu2 edu3 user2 q15 q17 q11 q12 q23 -> q27)
estat gof, stats(all) //
estat stable //
estat framework, standardized
estat mindices //
log close

*Sum all significant coefficients and copy and paste to Stata to do Spearman and Kendal Tau tests on independence of rankings:
label variable uni "Sum of significant associations from Univariate regressions"
label variable uni_ "Sum of all associations from Univariate regressions"
label variable mult "Sum of significant associations from 27 restricted Multivariate regression models"
label variable sem "Sum of significant associations from Structural Equation Model"
```

```
label variable sem_ "Sum of all associations from Structural Equation Model"
spearman uni uni_ mult sem, stats(rho obs p) sidak
ktau uni mult sem_, stats(taua taub score se obs p) sidak
*Add variables from summary convergent validity table denoting preferences
label variable multsem "Pooled ranking from mult and sem"
label variable imp "Ranking of 1-5 rating-scale importance questions"
label variable imp_ "Scores of 1-5 rating-scale importance questions"
label variable bws_top "Ranking of top-level utility tariff values"
label variable bws_top_ "Top-level utility tariff values"
label variable bws_bot "Reverse ranking of bottom-level utility tariff values"
*Test correlation of the ranking of the 27 QoL facets by these different measures of preference:
ktau imp bws_top multsem bws_bot, stats(taua taub score se obs p) sidak

*Regressions - wg and non arms combined and compared with multivariate regressions with 3 separate arms
use "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/wg and non combined Regressions"
gen comb =.
replace comb=1 if arm==1 | arm==2
replace comb=2 if arm==3
label define Comb 1 "wg+non combined" 2 "control"
label values comb Comb
*Univariate
regress phys ib(2).comb
estimates store phys_comb
regress psych ib(2).comb
estimates store psych_comb
regress social ib(2).comb
estimates store social_comb
regress envir ib(2).comb
estimates store envir_comb
regress q1 ib(2).comb
estimates store q1_comb
regress q2 ib(2).comb
estimates store q2_comb
outreg2 [*] using uni_comb, replace tex(pretty) nocons ti("Physical domain Regressions (wg+non combined)") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Univariate
regress phys ib(3).arm
estimates store phys_arm
regress psych ib(3).arm
estimates store psych_arm
```



```
regress social ib(3).arm
estimates store social_arm
regress envir ib(3).arm
estimates store envir_arm
regress q1 ib(3).arm
estimates store q1_arm
regress q2 ib(3).arm
estimates store q2_arm
outreg2 [*] using uni_arm, replace tex(pretty) nocons ti("Physical domain Regressions (wg+non combined)") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*PHYS
regress phys ib(3).arm i.marital i.ill //ib(3) means dummy variable regression with base comparison group as category 3 (control - in order to look at the gains of wg and non)
estimates store a_restr
regress phys ib(2).comb i.marital i.ill
estimates store a_restr_comb
regress phys ib(3).arm i.edu i.marital i.ill i.user
estimates store a_restr_user
regress phys ib(2).comb i.edu i.marital i.ill i.user
estimates store a_restr_user_comb
outreg2 [*] using phys_comb, replace tex(pretty) nocons ti("Physical domain Regressions (wg+non combined)") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*PSYCH
regress psych ib(3).arm i.edu i.marital i.ill
estimates store b_restr
regress psych ib(2).comb i.edu i.marital i.ill
estimates store b_restr_comb
regress psych ib(3).arm i.edu i.marital i.ill i.user
estimates store b_restr_user
regress psych ib(2).comb i.edu i.marital i.ill i.user
estimates store b_restr_user_comb
outreg2 [*] using psych_comb, replace tex(pretty) nocons ti("Psychology domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*SOCIAL
regress social ib(3).arm i.marital i.ill
estimates store c_restr
regress social ib(2).comb i.marital i.ill
estimates store c_restr_comb
regress social ib(3).arm i.marital i.ill i.user
estimates store c_restr_user
regress social ib(2).comb i.marital i.ill i.user
estimates store c_restr_user_comb
outreg2 [*] using social_comb, replace tex(pretty) nocons ti("Social Relationships domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
```

```
estimates clear
*ENVIR
regress envir ib(3).arm i.marital i.ill
estimates store d_restr
regress envir ib(2).comb i.marital i.ill
estimates store d_restr_comb
regress envir ib(3).arm i.ill i.user
estimates store d_restr_user
regress envir ib(2).comb i.ill i.user
estimates store d_restr_user_comb
outreg2 [*] using envir_comb, replace tex(pretty) nocons ti("Environmental domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Overall
regress q1 ib(3).arm i.marital i.ill
estimates store e_restr
regress q1 ib(2).comb i.marital i.ill
estimates store e_restr_comb
regress q1 ib(3).arm i.marital i.ill i.user
estimates store e_restr_user
regress q1 ib(2).comb i.marital i.ill i.user
estimates store e_restr_user_comb
outreg2 [*] using q1_comb, replace tex(pretty) nocons ti("Overall Quality of Life domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
*Health
regress q2 ib(3).arm i.edu i.marital i.ill age
estimates store f_restr
regress q2 ib(2).comb i.edu i.marital i.ill age
estimates store f_restr_comb
regress q2 ib(3).arm i.marital i.ill i.user age
estimates store f_restr_user
regress q2 ib(2).comb i.marital i.ill i.user age
estimates store f_restr_user_comb
outreg2 [*] using q2_comb, replace tex(pretty) nocons ti("Health domain Regressions") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear

//multicollinearity? run this after every regression (change var names) to find out
collin arm marital edu ill user //no problems: Tolerance all >0.9 (VIF<1.10)

*Endogeneity? (this section also reproduces all regression analyses)
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/QoL_Endogeneity_final.smcl", replace
use "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
//For stepwise regressions with control as the base:
gen arm_ =.
```



```
replace arm_ = 0 if arm==3
replace arm_ = 1 if arm==1
replace arm_ = 2 if arm==2
label variable arm_ "study arm with control as base=0  (wg=1, non=2)"
label define arm_ 0 "control" 1 "wg" 2 "non"
label values arm_ arm_
gen comb_ =.
replace comb_ = 0 if comb==2
replace comb_ = 1 if comb==1
label variable comb_ "village with control as base=0  (wg+non=1)"
label define comb_ 0 "control" 1 "wg+non"
label values comb_ comb_
gen wgnon_ =.
replace wgnon_ = 0 if wgnon==2
replace wgnon_ = 1 if wgnon==1
label variable wgnon_ "wg vs non with non as base=0  (wg=1)"
label define wgnon_ 0 "non" 1 "wg"
label values wgnon_ wgnon_
//Tests for endogeneity - QoL score being endogenous to WG members - compare WG and non-members in the same village
//1. Estimate restricted model of QoLdomain vs. wgnon + all indepvars
//2. save predicted values: predict QoLdomain_res
//3. Estimate model with same variables minus a couple of indepvars (those that drop out to get to the multivariate restricted) but wgnon as depvar vs. QoLdomain QoLdomain_res indepvars
//3.5 redo 3. with less indepvar if SE are too small (t-stats too high e.g. above 10?)
//4. Test QoL_domain_res - this tests null hypothesis of no edogeneity i.e p<0.05 means the QoLdomain is endogenous
//5. Hausman Test: store estimates after 1. and 3. and run tests as: hausman stored1 stored2 higher p values also conclude no endogeneity
*Test which variables are significantly associated with WG membership:
xi: stepwise, pr(.05): regress wgnon i.edu i.marital i.ill age age2 i.user
//these ones are, and should be included in the regression of step 3.:
regress wgnon i.edu i.marital i.user
*Each of the 4 domains:
foreach a in phys psych social envir {
    regress `a' wgnon i.edu i.marital i.ill age age2 i.user
    estimates store `a'M
    predict `a'M_res, res
    regress wgnon i.edu i.marital i.user `a' `a'M_res
    estimates store wgnon_`a'M
    test `a'M_res
    hausman `a'M wgnon_`a'M
    suest `a'M wgnon_`a'M
    test [`a'M_mean = wgnon_`a'M_mean], common
    regress `a' i.comb
```

```
    regress `a' i.comb_
    xtreg `a' i.comb_, re
    regress `a' wgnon
    regress  wgnon_
    xtreg `a' i.comb_, re
    regress `a' i.arm
    regress `a' i.arm_
    xtreg `a' i.arm_, re
    xi: stepwise, pr(.05): regress `a' i.comb_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress `a' wgnon_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress `a' i.arm_ i.edu i.marital i.ill age age2 i.user
}
*Each of the 27 facets:
forvalues i = 1/27 {
    regress q`i' wgnon i.edu i.marital i.ill age age2 i.user
    estimates store q`i'M
    predict q`i'M_res, res
    regress wgnon i.edu i.marital i.user q`i' q`i'M_res
    estimates store wgnon_q`i'M
    test q`i'M_res
    hausman q`i'M wgnon_q`i'M
    suest q`i'M wgnon_q`i'M
    test [q`i'M_mean = wgnon_q`i'M_mean], common
    regress q`i' i.comb
    regress q`i' i.comb_
    xtreg q`i' i.comb_, re
    regress q`i' wgnon
    regress q`i' wgnon_
    xtreg q`i' i.wgnon_, re
    regress q`i' i.arm
    regress q`i' i.arm_
    xtreg q`i' i.arm_, re
    xi: stepwise, pr(.05): regress q`i' i.comb_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress q`i' wgnon_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress q`i' i.arm_ i.edu i.marital i.ill age age2 i.user
}
log close
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_QoL_Endogeneity.dta", replace

//Multiple hypothesis testing adjustments
**From 'Figures for Thesis.xlsx' sheet QoL p-values:
**Paste data for domains from column G or facets from column H into blank Stata Data Editor
rename var1 pvalue
gen num = _n
```



```
sort pvalue
gen k=(_N+1)-_n //k is the rank of the pvalues, the larger k is the smaller the pvalue is
generate sidak=1-(1-pvalue)^k
replace sidak=sidak[_n-1] if sidak[_n-1]>sidak in 2/L
generate sig=""
replace sig = "****" if sidak<0.0001
replace sig = "***" if sidak<0.001 & sidak>=0.0001
replace sig = "**" if sidak<0.01 & sidak>=0.001
replace sig = "*" if sidak<0.05 & sidak>=0.01
generate bonferroni=min(1,pvalue*_N)
generate holm=min(1,(_n-1)*pvalue)
gsort -k
gen m = _n
gen benja05 = (m/_N)*0.05
gen benja_cut05 = pvalue-benja05
gen benja01 = (m/_N)*0.01
gen benja_cut01 = pvalue-benja01
gen benja001 = (m/_N)*0.001
gen benja_cut001 = pvalue-benja001
gen benja0001 = (m/_N)*0.0001
gen benja_cut0001 = pvalue-benja0001
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/QoL_facet_pvalues.dta", replace

```

```
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput1.smcl", replace
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/"
***Best-Worst Data Analysis***
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD.dta", replace
reshape long bw, i(id) j(bw_rank)
keep id arm bw_rank bw
recode bw (76=0) //to make 76 the reference category

foreach a in 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 ///
             34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 ///
             64 65 66 67 68 69 70 71 72 73 74 75 77 78 79 80 81 {
    gen x`a'=0
    replace x`a'=1 if bw==`a'
    tab x`a' bw_rank if x`a'==1, row
  }
  foreach a in 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 ///
             34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 ///
             64 65 66 67 68 69 70 71 72 73 74 75 77 78 79 80 81 {
    summ bw_rank if x`a'==1
  }

gen red=0
replace red=1 if bw==0 | bw==1 | bw==4 | bw==7 | bw==10 | bw==13 | bw==16 | bw==19 | bw==22 | bw==25 | bw==28 |  ///
                 bw==31 | bw==34 | bw==37 | bw==40 | bw==43 | bw==46 | bw==49 | bw==52 | bw==55 | bw==58 | bw==61 | ///
                 bw==64 | bw==67 | bw==70 | bw==73 | bw==76 | bw==79
gen yellow=0
replace yellow=1 if bw==2 | bw==5 | bw==8 | bw==11 | bw==14 | bw==17 | bw==20 | bw==23 | bw==26 | bw==29 | bw==32 | ///
                 bw==35 | bw==38 | bw==41 | bw==44 | bw==47 | bw==50 | bw==53 | bw==56 | bw==59 | bw==62 | bw==65 | ///
                 bw==68 | bw==71 | bw==74 | bw==77 | bw==80
gen green=0
replace green=1 if bw==3 | bw==6 | bw==9 | bw==12 | bw==15 | bw==18 | bw==21 | bw==24 | bw==27 | bw==30 | bw==33 | ///
                 bw==36 | bw==39 | bw==42 | bw==45 | bw==48 | bw==51 | bw==54 | bw==57 | bw==60 | bw==63 | bw==66 | ///
                 bw==69 | bw==72 | bw==75 | bw==78 | bw==81
gen colour=0
replace colour=1 if red==1
replace colour=2 if yellow==1
replace colour=3 if green==1
label define Colour 1 "red" 2 "yellow" 3 "green"
label values colour Colour
gen q=0
```



```
replace q=1 if bw==1 | bw==2 | bw==3
replace q=2 if bw==4 | bw==5 | bw==6
replace q=3 if bw==7 | bw==8 | bw==9
replace q=4 if bw==10 | bw==11 | bw==12
replace q=5 if bw==13 | bw==14 | bw==15
replace q=6 if bw==16 | bw==17 | bw==18
replace q=7 if bw==19 | bw==20 | bw==21
replace q=8 if bw==22 | bw==23 | bw==24
replace q=9 if bw==25 | bw==26 | bw==27
replace q=10 if bw==28 | bw==29 | bw==30
replace q=11 if bw==31 | bw==32 | bw==33
replace q=12 if bw==34 | bw==35 | bw==36
replace q=13 if bw==37 | bw==38 | bw==39
replace q=14 if bw==40 | bw==41 | bw==42
replace q=15 if bw==43 | bw==44 | bw==45
replace q=16 if bw==46 | bw==47 | bw==48
replace q=17 if bw==49 | bw==50 | bw==51
replace q=18 if bw==52 | bw==53 | bw==54
replace q=19 if bw==55 | bw==56 | bw==57
replace q=20 if bw==58 | bw==59 | bw==60
replace q=21 if bw==61 | bw==62 | bw==63
replace q=22 if bw==64 | bw==65 | bw==66
replace q=23 if bw==67 | bw==68 | bw==69
replace q=24 if bw==70 | bw==71 | bw==72
replace q=25 if bw==73 | bw==74 | bw==75
replace q=26 if bw==0 | bw==77 | bw==78
replace q=27 if bw==79 | bw==80 | bw==81
label define Q 1 "1. overall QoL" 2 "2. Health" 3 "3. Pain" 4 "4. Medicine" 5 "5. Enjoyment" 6 "6. Life meaning" ///
    7 "7. Concentration" 8 "8. Security" 9 "9. Envir. healthy" 10 "10. Energy" 11 "11. Appearance" 12 "12. Money" ///
    13 "13. Information" 14 "14. Leisure" 15 "15. Mobility" 16 "16. Sleep" 17 "17. Daily activities" ///
    18 "18. Work capacity" 19 "19. Self satisfaction" 20 "20. Relationships" 21 "21. Sex life" 22 "22. Support"   ///
    23 "23. Living conditions" 24 "24. Health serv. access" 25 "25. Transport" 26 "26. Depression" 27 "27. Food enough"
label values q Q

gen domain=0
replace domain=1 if q==3 | q==4 | q==10 | q==15 | q==16 | q==17 | q==18 | q==27 //including the extra question on food here (q27)
replace domain=2 if q==5 | q==6 | q==7 | q==11 | q==19 | q==26
replace domain=3 if q==20 | q==21 | q==22
replace domain=4 if q==8 | q==9 | q==12 | q==13 | q==14 | q==23 | q==24 | q==25
replace domain=5 if q==1
replace domain=6 if q==2
label define Domain 1 "PHYS" 2 "PSYCH" 3 "SOCIAL" 4 "ENVIR" 5 "Overall" 6 "Health"
label values domain Domain
```

```
foreach b in 1 2 3 4 5 6 7 {
    gen choice`b' = 0
    replace choice`b' = 1 if bw_rank==`b'
}

compress
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BW_unexploded.dta", replace

*Unexploded Rank-Ordered Logit:
rologit bw_rank x1-x81, group(id) rev //equivalent to: rologit
bw_rank i.bw, group(id) rev
*do for each arm:
rologit bw_rank x1-x81 if arm==1, group(id) rev //women's group
members
rologit bw_rank x1-x81 if arm==2, group(id) rev //non-members in the
same village
rologit bw_rank x1-x81 if arm==3, group(id) rev //control women

log close

*****do "/Users/timothycolbourn/Documents/PhD/Data/explode bw.do"
which also requires some copy and pasting to and from Excel 'BW
explode.xlsx'******

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BWoutput2.smcl", replace
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_exploded.dta",
replace
*Exploded Rank-Ordered Logit:
clogit choice x1-x81, group(idset) //gives the same result as rologit
on unexploded data.
clogit choice x1-x81 if arm==1, group(idset) //women's group members
clogit choice x1-x81 if arm==2, group(idset) //non-members in the
same village
clogit choice x1-x81 if arm==3, group(idset) //control women
//clogit choice i.bw, group(idset) //this also gives the same result
- best to use x1-x81 as above though as SBWMNL needs x1-x81 (with x's
coded as -1 for worst choices)

***Sequential Best-Worst Multinomial Logit: SBWMNL
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BW_exploded_SBWMNL.dta", replace //this should also have been made
from 'explode bw.do' earlier
label variable x1 "overallQoLbottom"
label variable x2 "overallQoLmid"
label variable x3 "overallQoLtop"
label variable x4 "healthbottom"
label variable x5 "healthmid"
label variable x6 "healthtop"
label variable x7 "painbottom"
label variable x8 "painmid"
```



```
label variable x9 "paintop"
label variable x10 "medicinebottom"
label variable x11 "medicinemid"
label variable x12 "medicinetop"
label variable x13 "enjoymentbottom"
label variable x14 "enjoymentmid"
label variable x15 "enjoymenttop"
label variable x16 "lifemeaningbottom"
label variable x17 "lifemeaningmid"
label variable x18 "lifemeaningtop"
label variable x19 "concentrationbottom"
label variable x20 "concentrationmid"
label variable x21 "concentrationtop"
label variable x22 "securitybottom"
label variable x23 "securitymid"
label variable x24 "securitytop"
label variable x25 "envirhealthybottom"
label variable x26 "envirhealthymid"
label variable x27 "envirhealthytop"
label variable x28 "energybottom"
label variable x29 "energymid"
label variable x30 "energytop"
label variable x31 "appearancebottom"
label variable x32 "appearancemid"
label variable x33 "appearancetop"
label variable x34 "moneybottom"
label variable x35 "moneymid"
label variable x36 "moneytop"
label variable x37 "informationbottom"
label variable x38 "informationmid"
label variable x39 "informationtop"
label variable x40 "leisurebottom"
label variable x41 "leisuremid"
label variable x42 "leisuretop"
label variable x43 "mobilitybottom"
label variable x44 "mobilitymid"
label variable x45 "mobilitytop"
label variable x46 "sleepbottom"
label variable x47 "sleepmid"
label variable x48 "sleeptop"
label variable x49 "dailyactivitiesbottom"
label variable x50 "dailyactivitiesmid"
label variable x51 "dailyactivitiestop"
label variable x52 "workcapacitybottom"
label variable x53 "workcapacitymid"
label variable x54 "workcapacitytop"
label variable x55 "selfsatisfactionbottom"
label variable x56 "selfsatisfactionmid"
label variable x57 "selfsatisfactiontop"
label variable x58 "relationshipsbottom"
label variable x59 "relationshipsmid"
label variable x60 "relationshipstop"
```

```
label variable x61 "sexlifebottom"
label variable x62 "sexlifemid"
label variable x63 "sexlifetop"
label variable x64 "supportbottom"
label variable x65 "supportmid"
label variable x66 "supporttop"
label variable x67 "livingconditionsbottom"
label variable x68 "livingconditionsmid"
label variable x69 "livingconditionstop"
label variable x70 "healthservaccessbottom"
label variable x71 "healthservaccessmid"
label variable x72 "healthservaccesstop"
label variable x73 "transportbottom"
label variable x74 "transportmid"
label variable x75 "transporttop"
*label variable x0 "depressionbottom"
label variable x77 "depressionmid"
label variable x78 "depressiontop"
label variable x79 "foodenoughbottom"
label variable x80 "foodenoughmid"
label variable x81 "foodenoughtop"
clogit choice x1-x81, group(idset) //same as the best ranked clogit (and rologit) above, but different data set-up accounting for worst choices (recode x0-x81 (1 = -1) if choiceset==2 | choiceset==4 | choiceset==6 )
//sequential best and worst choices makes for more efficient results - save 47 on the log likelihood
clogit choice x1-x81 if arm==1, group(idset) //women's group members
estimates store wg
clogit choice x1-x81 if arm==2, group(idset) //non-members in the same village
estimates store non
clogit choice x1-x81 if arm==3, group(idset) //control women
estimates store control
cd "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/"
outreg2 [*] using SBWMNL, replace tex(pretty) nocons ti("SBWMNL choice models for each study arm") ///
    label stats(coef pval ci) alpha(0.001, 0.01, 0.05)
estimates clear
log close

//graph of coefficients - copy and paste coefficients from cells DU12:GX21 in sheet 'rologit vs. SBWMNL'
//in 'scale parameter testing 3.xlsx' into a blank Stata Data Editor
label define Arm 1 "WG member" 2 "non-member" 3 "Control"
label values arm Arm
label define Stat 1 "Coefficient" 2 "lower95%" 3 "upper95%"
label values stat Stat
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/SBWMNL_coef.dta", replace
graph box overall_qol_bottom-envir_healthy_top, over(arm) ytitle("Utility - raw log odds model coefficient") ///
```



```
title("SBWMNL model coefficients for Quality of life attribute-levels (mean and 95%CI) by arm; graph 1 of 3", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/SBWMNL_coef_arm_q1q9.gph", replace
graph box energy_bottom-work_capacity_top, over(arm) ytitle("Utility - raw log odds model coefficient") ///
title("SBWMNL model coefficients for Quality of life attribute-levels (mean and 95%CI) by arm; graph 2 of 3", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/SBWMNL_coef_arm_q10q18.gph", replace
graph box self_satisfaction_bottom-food_enough_top, over(arm) ytitle("Utility - raw log odds model coefficient") ///
title("SBWMNL model coefficients for Quality of life attribute-levels (mean and 95%CI) by arm; graph 3 of 3", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/SBWMNL_coef_arm_q19q27.gph", replace

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput3.smcl", replace
//Grid-search (two-dimensional): rescaling data of arms 2 and 3 to test for scale differences (as data is coded as 0 and 1 that arm 1 is already 'normalised to have a scale of 1')
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_exploded_SBWMNL.dta", replace
foreach a in 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 {
        recode x0-x81 (1=`a') if arm==2 | arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2 | arm==3
}
recode x0-x81 (1=0.9) if arm==2
foreach a in 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 {
        recode x0-x81 (1=`a') if arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==3
}
recode x0-x81 (0.9=1) if arm==2
recode x0-x81 (1=0.9) if arm==3
foreach a in 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 {
        recode x0-x81 (1=`a') if arm==2
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2
}
recode x0-x81 (0.9=1) if arm==3
foreach a in 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 {
        recode x0-x81 (1=`a') if arm==2 | arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2 | arm==3
}
recode x0-x81 (1=0.99) if arm==2
foreach a in 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 {
        recode x0-x81 (1=`a') if arm==3
        clogit choice x1-x81, group(idset)
```

```
        recode x0-x81 (`a'=1) if arm==3
}
recode x0-x81 (0.99=1) if arm==2
recode x0-x81 (1=0.99) if arm==3
foreach a in 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 {
        recode x0-x81 (1=`a') if arm==2
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2
}
recode x0-x81 (0.99=1) if arm==3
foreach a in 1.111111111 1.25 1.428571429 1.666666667 2 2.5
3.333333333 5 10 {
        recode x0-x81 (1=`a') if arm==2 | arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2 | arm==3
}
foreach a in 1.01010101 1.020408163 1.030927835 1.041666667
1.052631579 1.063829787 1.075268817 1.086956522 1.098901099 {
        recode x0-x81 (1=`a') if arm==2 | arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2 | arm==3
}
///and so on...

*Scaled pooled models:
*rologit (exploded clogit): scales: arm1=1, arm2=1.11111,
arm3=1.11111
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_exploded.dta",
replace
recode x0-x81 (1=1.111111111) if arm==2 | arm==3
clogit choice x1-x81, group(idset)
recode x0-x81 (1.111111111=1) if arm==2 | arm==3
*SBWMNL (exploded clogit): scales: arm1=1, arm2=1.0753, arm3=1.11111
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BW_exploded_SBWMNL.dta", replace
recode x0-x81 (1=1.075268817) if arm==2
recode x0-x81 (1=1.111111111) if arm==3
clogit choice x1-x81, group(idset)
recode x0-x81 (1.111111111=1) if arm==3
recode x0-x81 (1.075268817=1) if arm==2

*One-dimensional grid search:
foreach a in 1.111111111 1.25 1.428571429 1.666666667 2 2.5
3.333333333 5 10 {
        recode x0-x81 (1=`a') if arm==3
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==3
}
foreach a in 1.01010101 1.020408163 1.030927835 1.041666667
1.052631579 1.063829787 1.075268817 1.086956522 1.098901099 {
        recode x0-x81 (1=`a') if arm==3
        clogit choice x1-x81, group(idset)
```



```
        recode x0-x81 (`a'=1) if arm==3
}
foreach a in 1.111111111 1.25 1.428571429 1.666666667 2 2.5
3.333333333 5 10 {
        recode x0-x81 (1=`a') if arm==1
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==1
}
foreach a in 1.01010101 1.020408163 1.030927835 1.041666667
1.052631579 1.063829787 1.075268817 1.086956522 1.098901099 {
        recode x0-x81 (1=`a') if arm==1
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==1
}
foreach a in 1.111111111 1.25 1.428571429 1.666666667 2 2.5
3.333333333 5 10 {
        recode x0-x81 (1=`a') if arm==2
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2
}
foreach a in 1.01010101 1.020408163 1.030927835 1.041666667
1.052631579 1.063829787 1.075268817 1.086956522 1.098901099 {
        recode x0-x81 (1=`a') if arm==2
        clogit choice x1-x81, group(idset)
        recode x0-x81 (`a'=1) if arm==2
}

*Reduced - 1st choice only - scaled pooled models:
//To test for scale differences over the depth of the best-worst
questions e.g. higher error variance linked to later choices in the
sequence
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_exploded.dta",
replace
recode x0-x81 (1=1.111111111) if arm==2 | arm==3
clogit choice x1-x81 if (bw_rank>=1 & bw_rank<=1.6), group(idset)
recode x0-x81 (1.111111111=1) if arm==2 | arm==3
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BW_exploded_SBWMNL.dta", replace
recode x0-x81 (1=1.075268817) if arm==2
recode x0-x81 (1=1.111111111) if arm==3
clogit choice x1-x81 if (bw_rank>=1 & bw_rank<=1.6), group(idset)
recode x0-x81 (1.111111111=1) if arm==3
recode x0-x81 (1.075268817=1) if arm==2

*****Making Utility tariffs for graphs****
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BW_exploded_SBWMNL.dta", replace
clogit choice x1-x81 if arm==1, group(idset) //women's group
members //repeat the code from here down to row 514 for each of the
other two arms
//each arm should be estimated separately given evidence of
preference heterogeity
```

```
matrix c_util = scalar(e(b)) //save the coef as a matrix
svmat c_util //convert the matrix to 80 separate variables in the dataset
keep c_util1-c_util80 //keep only the coef
rename c_util80 c_util81
rename c_util79 c_util80
rename c_util78 c_util79
rename c_util77 c_util78
rename c_util76 c_util77
keep in 1
compress
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_s_raw_arm1.dta", replace

//rescale coef so that all top levels add to 1:
egen c_util_tot_green = rowtotal(c_util3 c_util6 c_util9 c_util12 c_util15 c_util18 ///
    c_util21 c_util24 c_util27 c_util30 c_util33 c_util36 c_util39 c_util42 ///
    c_util45 c_util48 c_util51 c_util54 c_util57 c_util60 c_util63 c_util66 ///
    c_util69 c_util72 c_util75 c_util78 c_util81)
foreach c in 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 {
    gen c_util__`c' = c_util`c'*(1/c_util_tot_green)
}
egen c_util_totgreen = rowtotal(c_util__3-c_util__81)
list c_util_totgreen // c_util_totgreen should = 1

//rescale red (worst - level 1) and yellow (middle - level 3) in line with top levels (5; green)
gen c_util__1 = c_util1*(c_util__3/c_util3)
gen c_util__2 = c_util2*(c_util__3/c_util3)
gen c_util__4 = c_util4*(c_util__6/c_util6)
gen c_util__5 = c_util5*(c_util__6/c_util6)
gen c_util__7 = c_util7*(c_util__9/c_util9)
gen c_util__8 = c_util8*(c_util__9/c_util9)
gen c_util__10 = c_util10*(c_util__12/c_util12)
gen c_util__11 = c_util11*(c_util__12/c_util12)
gen c_util__13 = c_util13*(c_util__15/c_util15)
gen c_util__14 = c_util14*(c_util__15/c_util15)
gen c_util__16 = c_util16*(c_util__18/c_util18)
gen c_util__17 = c_util17*(c_util__18/c_util18)
gen c_util__19 = c_util19*(c_util__21/c_util21)
gen c_util__20 = c_util20*(c_util__21/c_util21)
gen c_util__22 = c_util22*(c_util__24/c_util24)
gen c_util__23 = c_util23*(c_util__24/c_util24)
gen c_util__25 = c_util25*(c_util__27/c_util27)
gen c_util__26 = c_util26*(c_util__27/c_util27)
gen c_util__28 = c_util28*(c_util__30/c_util30)
gen c_util__29 = c_util29*(c_util__30/c_util30)
gen c_util__31 = c_util31*(c_util__33/c_util33)
```



```
gen c_util__32 = c_util32*(c_util__33/c_util33)
gen c_util__34 = c_util34*(c_util__36/c_util36)
gen c_util__35 = c_util35*(c_util__36/c_util36)
gen c_util__37 = c_util37*(c_util__39/c_util39)
gen c_util__38 = c_util38*(c_util__39/c_util39)
gen c_util__40 = c_util40*(c_util__42/c_util42)
gen c_util__41 = c_util41*(c_util__42/c_util42)
gen c_util__43 = c_util43*(c_util__45/c_util45)
gen c_util__44 = c_util44*(c_util__45/c_util45)
gen c_util__46 = c_util46*(c_util__48/c_util48)
gen c_util__47 = c_util47*(c_util__48/c_util48)
gen c_util__49 = c_util49*(c_util__51/c_util51)
gen c_util__50 = c_util50*(c_util__51/c_util51)
gen c_util__52 = c_util52*(c_util__54/c_util54)
gen c_util__53 = c_util53*(c_util__54/c_util54)
gen c_util__55 = c_util55*(c_util__57/c_util57)
gen c_util__56 = c_util56*(c_util__57/c_util57)
gen c_util__58 = c_util58*(c_util__60/c_util60)
gen c_util__59 = c_util59*(c_util__60/c_util60)
gen c_util__61 = c_util61*(c_util__63/c_util63)
gen c_util__62 = c_util62*(c_util__63/c_util63)
gen c_util__64 = c_util64*(c_util__66/c_util66)
gen c_util__65 = c_util65*(c_util__66/c_util66)
gen c_util__67 = c_util67*(c_util__69/c_util69)
gen c_util__68 = c_util68*(c_util__69/c_util69)
gen c_util__70 = c_util70*(c_util__72/c_util72)
gen c_util__71 = c_util71*(c_util__72/c_util72)
gen c_util__73 = c_util73*(c_util__75/c_util75)
gen c_util__74 = c_util74*(c_util__75/c_util75)
gen c_util__76 = 0
gen c_util__77 = c_util77*(c_util__78/c_util78)
gen c_util__79 = c_util79*(c_util__81/c_util81)
gen c_util__80 = c_util80*(c_util__81/c_util81)
keep c_util__3-c_util__81 c_util__1-c_util__80
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_s_util_arm1.dta", replace
log close

*Calculation of Tariff scores using rank ordered clogit:
//make matrix of utility scores from exploded clogit (contained in file BW_s_util_arm1.dta - copy and paste and transpose into Excel template in sheet 'matrix (s_util_arm1)' in 'BW explode.xlsx')
//matrix of 5 levels - assuming level 2 is exactly between levels 1 and 3 and level 4 is exactly between 3 and 5
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput4.smcl", replace
use "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
drop q1_c_util-tariff_c_envir
matrix C_UTIL = (0.0084027, (0.0084027+0.0305265)/2, 0.0305265, (0.0305265+0.033209)/2, 0.033209\/* q1 overall QoL 1-5
*/0.0007254, (0.0007254+0.0189261)/2, 0.0189261, (0.0189261+0.0412939)/2, 0.0412939\/* q2 Health 1-5
```

```
*/0.0000343, (0.0000343+0.0291524)/2, 0.0291524,
(0.0291524+0.0343964)/2, 0.0343964\/* q3 Pain 1-5
*/0.0059252, (0.0059252+0.0275637)/2, 0.0275637,
(0.0275637+0.0290518)/2, 0.0290518\/* q4 Medicine 1-5
*/0.0096363, (0.0096363+0.0199788)/2, 0.0199788,
(0.0199788+0.0455005)/2, 0.0455005\/* q5 Enjoyment 1-5
*/0.0072258, (0.0072258+0.0230658)/2, 0.0230658,
(0.0230658+0.0387205)/2, 0.0387205\/* q6 Life meaning 1-5
*/0.0117607, (0.0117607+0.0305236)/2, 0.0305236,
(0.0305236+0.0353588)/2, 0.0353588\/* q7 Concentration 1-5
*/0.0063115, (0.0063115+0.0250202)/2, 0.0250202,
(0.0250202+0.0409407)/2, 0.0409407\/* q8 Security 1-5
*/0.0023301, (0.0023301+0.0237455)/2, 0.0237455,
(0.0237455+0.0372364)/2, 0.0372364\/* q9 Envir. healthy 1-5
*/0.0053806, (0.0053806+0.0294789)/2, 0.0294789,
(0.0294789+0.0477859)/2, 0.0477859\/* q10 Energy 1-5
*/0.00669, (0.00669+0.0240428)/2, 0.0240428, (0.0240428+0.0335804)/2,
0.0335804\/* q11 Appearance 1-5
*/-0.0028292, (-0.0028292+0.0326471)/2, 0.0326471,
(0.0326471+0.0348923)/2, 0.0348923\/* q12 Money 1-5
*/0.0070889, (0.0070889+0.02739)/2, 0.02739, (0.02739+0.0395671)/2,
0.0395671\/* q13 Information 1-5
*/0.0072089, (0.0072089+0.0301507)/2, 0.0301507,
(0.0301507+0.0358246)/2, 0.0358246\/* q14 Leisure 1-5
*/0.0054892, (0.0054892+0.0224316)/2, 0.0224316,
(0.0224316+0.0301869)/2, 0.0301869\/* q15 Mobility 1-5
*/0.0129647, (0.0129647+0.0191582)/2, 0.0191582,
(0.0191582+0.0311263)/2, 0.0311263\/* q16 Money 1-5
*/0.0070476, (0.0070476+0.0293757)/2, 0.0293757,
(0.0293757+0.0502029)/2, 0.0502029\/* q17 Daily activities 1-5
*/0.0095727, (0.0095727+0.0285695)/2, 0.0285695,
(0.0285695+0.0391111)/2, 0.0391111\/* q18 Work capacity 1-5
*/0.0130158, (0.0130158+0.0207551)/2, 0.0207551,
(0.0207551+0.0308485)/2, 0.0308485\/* q19 Self satisfaction 1-5
*/0.0053363, (0.0053363+0.0265547)/2, 0.0265547,
(0.0265547+0.0383488)/2, 0.0383488\/* q20 Relationships 1-5
*/0.0100268, (0.0100268+0.0244871)/2, 0.0244871,
(0.0244871+0.0280393)/2, 0.0280393\/* q21 Sex Life 1-5
*/0.0047421, (0.0047421+0.0238095)/2, 0.0238095,
(0.0238095+0.0348613)/2, 0.0348613\/* q22 Support 1-5
*/0.0144427, (0.0144427+0.0214437)/2, 0.0214437,
(0.0214437+0.0457796)/2, 0.0457796\/* q23 Living conditions 1-5
*/0.0071226, (0.0071226+0.0281767)/2, 0.0281767,
(0.0281767+0.0394159)/2, 0.0394159\/* q24 Health serv. access 1-5
*/0.0076479, (0.0076479+0.0213698)/2, 0.0213698,
(0.0213698+0.0329241)/2, 0.0329241\/* q25 Transport 1-5
*/0, (0+0.018641)/2, 0.018641, (0.018641+0.028216)/2, 0.028216\/* q26
Depression 1-5
*/0.0069027, (0.0069027+0.0225268)/2, 0.0225268,
(0.0225268+0.0435813)/2, 0.0435813) //q27 Food enough 1-5mat list
C_UTIL
plotmatrix, mat(C_UTIL)
```



```

foreach e in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 {
    gen q`e'_s1_util=C_UTIL[`e',q`e'[_n]]
}
egen tariff_s1 = rowtotal(q1_s1_util-q27_s1_util)
gen tariff_s1_phys = q3_s1_util + q4_s1_util + q10_s1_util +
q15_s1_util + q16_s1_util + q17_s1_util + q18_s1_util
gen tariff_s1_psych = q5_s1_util + q6_s1_util + q7_s1_util +
q11_s1_util + q19_s1_util + q26_s1_util
gen tariff_s1_social = q20_s1_util + q21_s1_util + q22_s1_util
gen tariff_s1_envir = q8_s1_util + q9_s1_util + q12_s1_util +
q13_s1_util + q14_s1_util + q23_s1_util + q24_s1_util + q25_s1_util
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
TimPhD_31052012.dta", replace

svmat C_UTIL
keep C_UTIL1-C_UTIL5
keep in 1/27
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
S_UTILmatrix_arm1.dta", replace
log close
clear
//copy and paste this to Excel - then transpose paste and recopy into
blank Stata to make graph with q1 - q27 on the x axis and utility on
the y-axis:
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
BWoutput5.smcl", replace
label variable q1 "1. overall QoL"
label variable q2 "2. Health"
label variable q3 "3. Pain"
label variable q4 "4. Medicine"
label variable q5 "5. Enjoyment"
label variable q6 "6. Life meaning"
label variable q7 "7. Concentration"
label variable q8 "8. Security"
label variable q9 "9. Envir. healthy"
label variable q10 "10. Energy"
label variable q11 "11. Appearance"
label variable q12 "12. Money"
label variable q13 "13. Information"
label variable q14 "14. Leisure"
label variable q15 "15. Mobility"
label variable q16 "16. Sleep"
label variable q17 "17. Daily activities"
label variable q18 "18. Work capacity"
label variable q19 "19. Self satisfaction"
label variable q20 "20. Relationships"
label variable q21 "21. Sex life"
label variable q22 "22. Support"
label variable q23 "23. Living conditions"
label variable q24 "24. Health serv. access"
```

```
label variable q25 "25. Transport"
label variable q26 "26. Depression"
label variable q27 "27. Food enough"
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/S_UTIL_tmatrix_arm1.dta", replace

graph box q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20 q21 q22 q23 q24 q25 q26 q27, ytitle(Utility) yscale(range(-.01(.01).05)) ///
title("Utility associated with each level of each attribute (SBWMNL, wg)", size(small)) showyvars legend(off)
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/S_UTIL_arm1.gph", replace
//have to manually change the x-axis labels to vsmall vertical and resave as I can't get Stata to do it!
log close

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput5.smcl", replace
//after making tariffs for each arms preferences (repeating the code above for each arm - see BW_repeat.do):
//tests of different utilities by arm - SBWMNL utilities - given preference heterogeniety use separate tariffs from each arm, and compare these
*first make tariff variables combining the attribute, domain and total tariffs for each arm:
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_31052012.dta", replace
foreach g in 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 {
    gen q`g'_util =.
    replace q`g'_util = q`g'_s1_util if arm==1
    replace q`g'_util = q`g'_s2_util if arm==2
    replace q`g'_util = q`g'_s3_util if arm==3
}
foreach f in phys psych social envir {
    gen tariff_`f' =.
    replace tariff_`f' = tariff_s1_`f' if arm==1
    replace tariff_`f' = tariff_s2_`f' if arm==2
    replace tariff_`f' = tariff_s3_`f' if arm==3
}
gen tariff =.
replace tariff = tariff_s1 if arm==1
replace tariff = tariff_s2 if arm==2
replace tariff = tariff_s3 if arm==3
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_31052012.dta", replace
log close
clear
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput5_util_ttests.smcl", replace
*Then do T-Tests + save results for graphs
```



```
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_31052012.dta", replace
gen stat =.
set obs 549
replace arm = 1 in 535/538
replace arm = 2 in 539/542
replace arm = 3 in 543/549
replace stat = 1 in 535
replace stat = 2 in 536
replace stat = 3 in 537
replace stat = 4 in 538
replace stat = 1 in 539
replace stat = 2 in 540
replace stat = 3 in 541
replace stat = 4 in 542
replace stat = 1 in 543
replace stat = 2 in 544
replace stat = 3 in 545
replace stat = 4 in 546
replace stat = 5 in 547
replace stat = 6 in 548
replace stat = 7 in 549
label define Stat 1 "mean" 2 "lower95%" 3 "upper95%" 4 "se mean" 5 "p wgnon" 6 "p wgcontrol" 7 "p noncontrol"
label values stat Stat

foreach f in tariff_phys tariff_psych tariff_social tariff_envir q1_util q2_util ///
        q3_util q4_util q5_util q6_util q7_util q8_util q9_util q10_util q11_util ///
        q12_util q13_util q14_util q15_util q16_util q17_util q18_util q19_util ///
        q20_util q21_util q22_util q23_util q24_util q25_util q26_util q27_util {
    summ `f' if arm==1
    gen `f'_ =.
    replace `f'_ = scalar(r(mean)) in 535
    replace `f'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 538
    replace `f'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/sqrt(scalar(r(N)))) in 536
    replace `f'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/sqrt(scalar(r(N)))) in 537
}
foreach g in tariff_phys tariff_psych tariff_social tariff_envir q1_util q2_util ///
        q3_util q4_util q5_util q6_util q7_util q8_util q9_util q10_util q11_util ///
        q12_util q13_util q14_util q15_util q16_util q17_util q18_util q19_util ///
        q20_util q21_util q22_util q23_util q24_util q25_util q26_util q27_util {
    summ `g' if arm==2
```

```
    replace `g'_ = scalar(r(mean)) in 539
    replace `g'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 542
    replace `g'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 540
    replace `g'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 541
}
foreach h in tariff_phys tariff_psych tariff_social tariff_envir
q1_util q2_util ///
        q3_util q4_util q5_util q6_util q7_util q8_util q9_util
q10_util q11_util ///
        q12_util q13_util q14_util q15_util q16_util q17_util
q18_util q19_util ///
        q20_util q21_util q22_util q23_util q24_util q25_util
q26_util q27_util {
    summ `h' if arm==3
    replace `h'_ = scalar(r(mean)) in 543
    replace `h'_ = scalar(r(sd))/sqrt(scalar(r(N))) in 546
    replace `h'_ = scalar(r(mean)) - (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 544
    replace `h'_ = scalar(r(mean)) + (1.96*scalar(r(sd))/
sqrt(scalar(r(N)))) in 545
    ttest `h', by(wgnon)
    replace `h'_ = scalar(r(p)) in 547
    ttest `h', by(wgcontrol)
    replace `h'_ = scalar(r(p)) in 548
    ttest `h', by(noncontrol)
    replace `h'_ = scalar(r(p)) in 549
}
keep in 535/549
keep arm stat tariff_phys_-q27_util_
label variable q1_util_ "1. overall QoL"
label variable q2_util_ "2. Health"
label variable q3_util_ "3. Pain"
label variable q4_util_ "4. Medicine"
label variable q5_util_ "5. Enjoyment"
label variable q6_util_ "6. Life meaning"
label variable q7_util_ "7. Concentration"
label variable q8_util_ "8. Security"
label variable q9_util_ "9. Envir. healthy"
label variable q10_util_ "10. Energy"
label variable q11_util_ "11. Appearance"
label variable q12_util_ "12. Money"
label variable q13_util_ "13. Information"
label variable q14_util_ "14. Leisure"
label variable q15_util_ "15. Mobility"
label variable q16_util_ "16. Sleep"
label variable q17_util_ "17. Daily activities"
label variable q18_util_ "18. Work capacity"
label variable q19_util_ "19. Self satisfaction"
label variable q20_util_ "20. Relationships"
label variable q21_util_ "21. Sex life"
```



```
label variable q22_util_ "22. Support"
label variable q23_util_ "23. Living conditions"
label variable q24_util_ "24. Health serv. access"
label variable q25_util_ "25. Transport"
label variable q26_util_ "26. Depression"
label variable q27_util_ "27. Food enough"
label variable tariff_phys_ "Physical domain"
label variable tariff_psych_ "Psychological domain"
label variable tariff_social_ "Social Relationships domain"
label variable tariff_envir_ "Environmental domain"
compress
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_s_ttest.dta",
replace

graph box tariff_phys_ tariff_psych_ tariff_social_ tariff_envir_ if
stat==1 | stat==2 | stat==3, over(arm) ytitle(Utility) ///
title("Quality of life domain Utilities (SBWMNL) (mean and 95%CI) by
arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_domain_arm.gph", replace
graph box q1_util_ q2_util_ if stat==1 | stat==2 | stat==3, over(arm)
ytitle(Utility) ///
title("Quality of life domain Utilities (SBWMNL) (mean and 95%CI) by
arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_overall_arm.gph", replace
graph box q3_util_ q4_util_ q10_util_ q15_util_ q16_util_ q17_util_
q18_util_ q27_util_ if stat==1 | stat==2 | stat==3, over(arm)
ytitle(Utility) ///
title("Physical domain facet Utilities (SBWMNL) (mean and 95%CI) by
arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_phys_q_arm.gph", replace
graph box q5_util_ q6_util_ q7_util_ q11_util_ q19_util_ q26_util_ if
stat==1 | stat==2 | stat==3, over(arm) ytitle(Utility) ///
title("Psychological domain facet Utilities (SBWMNL) (mean and 95%CI)
by arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_psych_q_arm.gph", replace
graph box q20_util_ q21_util_ q22_util_ if stat==1 | stat==2 |
stat==3, over(arm) ytitle(Utility) ///
title("Social Relationships domain facet Utilities (SBWMNL) (mean and
95%CI) by arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_social_q_arm.gph", replace
graph box q8_util_ q9_util_ q12_util_ q13_util_ q14_util_ q23_util_
q24_util_ q25_util_ if stat==1 | stat==2 | stat==3, over(arm)
ytitle(Utility) ///
title("Environmental domain facet Utilities (SBWMNL) (mean and 95%CI)
by arm", size(small))
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/
s_envir_q_arm.gph", replace
```

```
log close

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/Pref_QoL_Endogeneity_final.smcl", replace
***Multivariate analaysis of preference-weighted QoL domain and facets scores by study arm
use "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_31052012.dta", replace
//For stepwise regressions with control as the base:
gen arm_ =.
replace arm_ = 0 if arm==3
replace arm_ = 1 if arm==1
replace arm_ = 2 if arm==2
label variable arm_ "study arm with control as base=0  (wg=1, non=2)"
label define arm_ 0 "control" 1 "wg" 2 "non"
label values arm_ arm_
gen comb_ =.
replace comb_ = 0 if comb==2
replace comb_ = 1 if comb==1
label variable comb_ "village with control as base=0  (wg+non=1)"
label define comb_ 0 "control" 1 "wg+non"
label values comb_ comb_
gen wgnon_ =.
replace wgnon_ = 0 if wgnon==2
replace wgnon_ = 1 if wgnon==1
label variable wgnon_ "wg vs non with non as base=0  (wg=1)"
label define wgnon_ 0 "non" 1 "wg"
label values wgnon_ wgnon_
//Tests for endogeneity - QoL score being endogenous to WG members - compare WG and non-members in the same village
//1. Estimate restricted model of QoLdomain vs. wgnon + all indepvars
//2. save predicted values: predict QoLdomain_res
//3. Estimate model with same variables minus a couple of indepvars (those that drop out to get to the multivariate restricted) but wgnon as depvar vs. QoLdomain QoLdomain_res indepvars
//3.5 redo 3. with less indepvar if SE are too small (t-stats too high e.g. above 10?)
//4. Test QoL_domain_res - this tests null hypothesis of no edogeneity i.e p<0.05 means the QoLdomain is endogenous
//5. Hausman Test: store estimates after 1. and 3. and run tests as: hausman stored1 stored2 higher p values also conclude no endogeneity
*Test which variables are significantly associated with WG membership:
xi: stepwise, pr(.05): regress wgnon i.edu i.marital i.ill age age2 i.user
//these ones are, and should be included in the regression of step 3.:
regress wgnon i.edu i.marital i.user
*Each of the 4 domains:
foreach a in tariff_phys tariff_psych tariff_social tariff_envir {
    regress `a' wgnon i.edu i.marital i.ill age age2 i.user
    estimates store `a'M
```



```
    predict `a'M_res, res
    regress wgnon i.edu i.marital i.user `a' `a'M_res
    estimates store wgnon_`a'M
    test `a'M_res
    hausman `a'M wgnon_`a'M
    suest `a'M wgnon_`a'M
    test [`a'M_mean = wgnon_`a'M_mean], common
    regress `a' i.comb
    regress `a' i.comb_
    xtreg `a' i.comb_, re
    regress `a' wgnon
    regress  wgnon_
    xtreg `a' i.comb_, re
    regress `a' i.arm
    regress `a' i.arm_
    xtreg `a' i.arm_, re
    xi: stepwise, pr(.05): regress `a' i.comb_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress `a' wgnon_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress `a' i.arm_ i.edu i.marital i.ill age age2 i.user
}
*Each of the 27 facets:
forvalues i = 1/27 {
    regress q`i'_util wgnon i.edu i.marital i.ill age age2 i.user
    estimates store q`i'_utilM
    predict q`i'_utilM_res, res
    regress wgnon i.edu i.marital i.user q`i'_util q`i'_utilM_res
    estimates store wgnon_q`i'_utilM
    test q`i'_utilM_res
    hausman q`i'_utilM wgnon_q`i'_utilM
    suest q`i'_utilM wgnon_q`i'_utilM
    test [q`i'_utilM_mean = wgnon_q`i'_utilM_mean], common
    regress q`i'_util i.comb
    regress q`i'_util i.comb_
    xtreg q`i'_util i.comb_, re
    regress q`i'_util wgnon
    regress q`i'_util wgnon_
    xtreg q`i'_util i.wgnon_, re
    regress q`i'_util i.arm
    regress q`i'_util i.arm_
    xtreg q`i'_util i.arm_, re
    xi: stepwise, pr(.05): regress q`i'_util i.comb_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress q`i'_util wgnon_ i.edu i.marital i.ill age age2 i.user
    xi: stepwise, pr(.05): regress q`i'_util i.arm_ i.edu i.marital i.ill age age2 i.user
}
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/TimPhD_PrefQoL_Endogeneity.dta", replace
```

```
log close

log using "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BWoutput6.smcl", replace
//Multiple hypothesis testing adjustments
**From 'BW explode.xlsx' sheet T-Test (Holm)_SBWMNL:
**Paste data for 18 comparisons (domains) from column AI or 75 comparisons (items) ///
//from column AJ in same order as Excel into blank Stata Data Editor
rename var1 pvalue
gen num = _n
sort pvalue
gen k=(_N+1)-_n //k is the rank of the pvalues, the larger k is the smaller the pvalue is
generate sidak=1-(1-pvalue)^k
replace sidak=sidak[_n-1] if sidak[_n-1]>sidak in 2/L
generate sig=""
replace sig = "****" if sidak<0.0001
replace sig = "***" if sidak<0.001 & sidak>=0.0001
replace sig = "**" if sidak<0.01 & sidak>=0.001
replace sig = "*" if sidak<0.05 & sidak>=0.01
generate bonferroni=min(1,pvalue*_N)
generate holm=min(1,(_n-1)*pvalue)
gsort -k
gen m = _n
gen benja05 = (m/_N)*0.05
gen benja_cut05 = pvalue-benja05
gen benja01 = (m/_N)*0.01
gen benja_cut01 = pvalue-benja01
gen benja001 = (m/_N)*0.001
gen benja_cut001 = pvalue-benja001
gen benja0001 = (m/_N)*0.0001
gen benja_cut0001 = pvalue-benja0001
save "/Users/timothycolbourn/Dropbox/Tim's PhD/Data/BW_s_75pvalues.dta", replace // or BW_75pvalues.dta
//_n-1 = the number of p-values smaller than the current pvalue
//[_n-1] = the previous pvalue (the one immediately smaller)
log close

```

```
log using "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CVoutput.smcl", replace
***CONTINGENT VALUATION STUDY***
use "/Users/timothycolbourn/Documents/PhD/Data/TimPhD.dta", replace
keep id arm edu marital ill illness a1-totaltime
drop if a1=="" & a2=="" & b4==. & b7a=="" & b8==.
drop v95 endcv
encode a1, generate(a1_) label(YN)
encode a2, generate(a2_) label(YN)
encode b3, generate(b3_) label(YN)
encode b6a, generate(b6a_) label(YN)
encode b7a, generate(b7a_) label(YN)
encode d13, generate(d13_) label(YN)
encode f24a, generate(f24a_) label(YN)
recode a1_ a2_ b3_ b6a_ b7a_ d13_ f24a_ (2=0) (3=1)
drop a1 a2 b3 b6a b7a d13 f24a
rename a1_ a1
rename a2_ a2
rename b3_ b3
rename b6a_ b6a
rename b7a_ b7a
rename d13_ d13
rename f24a_ f24a
save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV.dta", replace

**Descriptive stats
tabstat a1 a2 b3 b6a b7a, by(arm) stat(n mean semean) format(%8.3f) longstub
tabstat b4, by(arm) stat(n min max mean semean) format(%8.3f) longstub //No of WG meetings
recode b4 (.=0) //to get number of meetings assuming 0 for those who didn't answer (those who answered No to A2 (ever attended)):
tabstat b4, by(arm) stat(n min max mean semean) format(%8.3f) longstub
recode b8 (9=.) (-9=.) //Don't know=-9 (which was also sometimes mistakenly entered as 9)
tabstat b8, by(arm) stat(n min max mean semean) format(%10.0f) longstub //cost of WG per month
recode c9 (9=.) //Don't know
tab arm c9, row //Literacy
label define HighLow 0 "Low" 1 "High"
label values c10a HighLow
tabstat c10a, by(arm) stat(n mean semean) format(%8.3f) longstub //Risk to MNH high (1) or low (0)?
//WG members perceive the risk to be lower - is this because of the WG?
//and control women perceive the risk to be higher than non-members too.
recode c11 (9=.) //Don't know
tabstat c11, by(arm) stat(n min max mean semean) format(%8.3f) longstub //no. of ANC visits
//less ANC visits in control women
```



```
tab arm c12, row //Place of delivery
//Slightly less health facility delivery in control women but >80% in each of the three groups!
tab arm d13, row //WTP Y/N - less in control group (as might be expected)
tabstat d13, by(arm) stat(n mean semean) format(%8.3f) longstub //WTP Y/N
regress d13 i.arm //the proportion of control group women who are WTP is significantly less
tab arm e14 if d13==0, row //check that none who were not willing to pay answered the payment vehicle question
tab arm e14, row //payment vehicle
graph pie, over(e14) by(arm, total) plabel(_all percent, format(%3.0f)) //pie chart of differences in payment vehicle by arm
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_payment_vehicle.gph", replace
//Box plots of household expenditure:
//Money
label variable e15a "food"
label variable e15b "agriculture"
label variable e15c "rent"
label variable e15d "transport"
label variable e15e "education"
label variable e15f "healthcare"
label variable e15g "social"
label variable e15h "other"
label variable e16 "barter"
graph box e15a e15b e15c e15d e15e e15f e15g e15h e16, ytitle("Money (MKW)") over(arm) ///
title("Household expenditure: Money in a month, by category by arm", size(small)) showyvars legend(off) noout
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_HH_expenditure_money.gph", replace
regress e17 i.arm //no significant differences in total HH monetary expenditure by arm
//have to manually make the x-axis labels vertical and small
//Time - looks like some are giving daily expenditure (lots of 1 hrs) - adjust this?
label variable e19a "cooking"
label variable e19b "cleaning"
label variable e19c "children"
label variable e19d "housework"
label variable e19e "farming"
label variable e19f "work"
label variable e19g "social"
graph box e19a e19b e19c e19d e19e e19f e19g if arm==1 | arm==2, ytitle("Time (Hours)") over(arm) ///
title("Household expenditure: Time in a week, by category by arm", size(small)) showyvars legend(off) noout
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_HH_expenditure_time.gph", replace
//adjustments for those who it looks like gave the amount of time
```

```
they spend per day on the different activities:
foreach i in a b c d e f g h {
    gen e19`i'_=e19`i'
    replace e19`i'_ = e19`i'*7 if id==20 | id==40 | id==60 | id==90 | id==115 | id==130 | id==175 | id==210 | ///
        id==215 | id==220 | id==230 | id==245 | id==250 | id==340 | id==350
        }
label variable e19a_ "cooking"
label variable e19b_ "cleaning"
label variable e19c_ "children"
label variable e19d_ "housework"
label variable e19e_ "farming"
label variable e19f_ "work"
label variable e19g_ "social"
label variable e19h_ "total time"
graph box e19a_ e19b_ e19c_ e19d_ e19e_ e19f_ e19g_ if arm==1 | arm==2, ytitle("Time (Hours)") over(arm) ///
title("Household expenditure: Time in a week (corrected), by category by arm", size(small)) showyvars legend(off) noout
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_HH_expenditure_time(corrected).gph", replace
regress e19h_ i.arm //no significant differences in total HH time expenditure by arm (control: n=1)
//Ufa
label variable e21a "household"
label variable e21b "others"
label variable e21c "selling"
label variable e21d "giving"
graph box e21a e21b e21c e21d, ytitle("Maize flour (Kg)") over(arm) ///
title("Household expenditure: Maize flour in a month, by category by arm", size(small)) showyvars legend(off) noout
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_HH_expenditure_ufa.gph", replace
regress e21d i.arm //no significant differences in total HH Ufa expenditure by arm
//Tables of household expenditure:
*Money
tab arm e15a if e14>1, row //check money questions not answered by those not WTP money
tab arm e15b if e14>1, row
tab arm e15c if e14>1, row
tab arm e15d if e14>1, row
tab arm e15e if e14>1, row
tab arm e15f if e14>1, row
tab arm e15g if e14>1, row
tab arm e15h if e14>1, row
tab arm e15i if e14>1, row
tabstat e15a e15b e15c e15d e15e e15f e15g e15h e15i e16 e17, by(arm) stat(n min max p25 median p75 mean semean) format(%10.0f) longstub
//HH expenditure mean: control > WG members > non-members; median: WG
```



```
members = control > non-members
tabstat e18, by(arm) stat(n min max p25 median p75 mean semean) format(%10.0f) longstub //money WTP: control = non-members > WG members
gen propWTP_m = e18/e17
tabstat propWTP_m, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub //same with proportions
*Time
tab arm e19a if e14 !=2, row //check time questions not answered by those not WTP money
tab arm e19b if e14 !=2, row
tab arm e19c if e14 !=2, row
tab arm e19d if e14 !=2, row
tab arm e19e if e14 !=2, row
tab arm e19f if e14 !=2, row
tab arm e19g if e14 !=2, row
tab arm e19h if e14 !=2, row
tabstat e19a e19b e19c e19d e19e e19f e19g e19h, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub
*Time(corrected)
tabstat e19a_ e19b_ e19c_ e19d_ e19e_ e19f_ e19g_ e19h_, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub
//Time: WG > non-member (control: n=1, 112h)
tabstat e20, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub //time WTP: median: control > WG > non-member
//what about correcting the WTP as well for the respondents that may have given daily amounts of time?
gen e20_=e20
replace e20_ = e20*7 if id==20 | id==40 | id==60 | id==90 | id==115 | id==130 | id==175 | id==210 | ///
        id==215 | id==220 | id==230 | id==245 | id==250 | id==340 | id==350
tabstat e20_, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub
//mean: WG > control > non-member
//Time WTP_proportion of total expenditure
gen propWTP_t = e20/e19h
tabstat propWTP_t, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub
*Time(corrected)
gen propWTP_t_ = e20/e19h_
tabstat propWTP_t_, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub
*Time(corrected corrected)
gen propWTP_t__ = e20_/e19h_
tabstat propWTP_t__, by(arm) stat(n min p25 median p75 max mean semean) format(%8.3f) longstub //these are the same as the uncorrected percentages
//time WTP proportion: median and mean: WG > non-member > control
*Ufa
tab arm e21a if e14 !=3, row //check time questions not answered by those not WTP ufa
```

```
tab arm e21b if e14 !=3, row
tab arm e21c if e14 !=3, row
tab arm e21d if e14 !=3, row
tab arm e21e if e14 !=3, row
replace e21a = e21a/50 if id==65 | id==260 //id no. 65 and 260 were recorded wrong and possibly in Kwacha - therefore divide by 50K/kg Ufa
//not sure if this is correct though as id no. 65 is still higher than the others (584kg)
//Therefore is it better to convert these as missing?
replace e21b = e21b/50 if id==65 | id==260
replace e21c = e21c/50 if id==65 | id==260
replace e21d = e21d/50 if id==65 | id==260
replace e21e = e21e/50 if id==65 | id==260
replace e22 = e22/50 if id==65 | id==260
tabstat e21a e21b e21c e21d e21e, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub
//Ufa: WG = non-member = control
tabstat e22, by(arm) stat(n min max p25 median p75 mean semean) format(%10.1f) longstub //ufa WTP: median: WG = non-member = control
//mean: WG = non-member > control
gen propWTP_u = e22/e21e
tabstat propWTP_u, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub
//ufa WTP proportion: median and mean: non-member > WG > control
tabstat f24a, by(arm) stat(n mean semean) format(%8.3f) longstub
*Overall - doesn't make sense given problems with exchange rates
gen propWTP = .
replace propWTP = propWTP_m if propWTP_m !=.
replace propWTP = propWTP_t if propWTP_t !=.
replace propWTP = propWTP_u if propWTP_u !=.
tabstat propWTP, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub
//overall WTP proportion: median and mean: WG roughly= non-member > control

//conversion to standard score - linear transformations (x-meam/sd) - lead to time and ufa having some negative values when
//back translated to money, therefore not used for final results. Use ratio scale transformation instead - see below.
tabstat e18 e20_ e22, stat(mean semean skew kurtosis) format(%10.1f) longstub //similar skew and kurtosis for all three
*WTP - absolute amount
egen e18_m = mean(e18)
egen e18_sd = sd(e18)
gen e18_s = (e18 - e18_m)/e18_sd
egen e20__m = mean(e20_)
egen e20__sd = sd(e20_)
gen e20__s = (e20_ - e20__m)/e20__sd
egen e22_m = mean(e22)
egen e22_sd = sd(e22)
gen e22_s = (e22 - e22_m)/e22_sd
```



```
gen wss = .
replace wss = e18_s if e18_s!=.
replace wss = e20__s if e20__s!=.
replace wss = e22_s if e22_s!=.
//convert back to money, time, ufa
gen wtp = (wss*e18_sd) + e18_m //probably only need to use this SOME NEGATIVE VALUES!
list wtp wss e18_s e20__s e22_s e18 e18_m e18_sd e20_ e20__m e20__sd e22 e22_m e22_sd if wtp<0
//only the cases with time=1hr or ufa WTP=1kg have negative single metric money WTP. Is there a way of constraining the minimum to be 0 rather than negative?
gen wtp_t = (wss*e20__sd) + e20__m
gen wtp_u = (wss*e22_sd) + e22_m
tabstat wtp, by(arm) stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub
*HH expenditure
tabstat e17 e19h_ e21e, stat(mean semean skew kurtosis) format(%10.1f) longstub //ufa expenditure (e21_e) is more skewed
egen e17_m = mean(e17)
egen e17_sd = sd(e17)
gen e17_s = (e17 - e17_m)/e17_sd
egen e19h__m = mean(e19h_)
egen e19h__sd = sd(e19h_)
gen e19h__s = (e19h_ - e19h__m)/e19h__sd
egen e21e_m = mean(e21e)
egen e21e_sd = sd(e21e)
gen e21e_s = (e21e - e21e_m)/e21e_sd
gen hss = .
replace hss = e17_s if e17_s!=.
replace hss = e19h__s if e19h__s!=.
replace hss = e21e_s if e21e_s!=.
//convert back to money, time, ufa
gen hexp = (hss*e17_sd) + e17_m //probably only need to use this
gen hexp_t = (hss*e19h__sd) + e19h__m
gen hexp_u = (hss*e21e_sd) + e21e_m
tabstat hexp, by(arm) stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub //min HH exp is quite far below 0 in some cases!
*WTP proportion of total expenditure (also standardised):
gen wtp_prop = wtp/hexp
tabstat wtp_prop, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub

**RATIO SCALE TRANSFORMATION: x/sqrt(sum(x^2))
//used in final results as does not lead to negative values.
*WTP - absolute amount
gen e18_sq = e18^2
egen e18_sumsq = total(e18^2)
gen e18_sqrtsumsq = sqrt(e18_sumsq)
gen e18_rt = e18/e18_sqrtsumsq
gen e20__sq = e20_^2
```

```
egen e20__sumsq = total(e20_^2)
gen e20__sqrtsumsq = sqrt(e20__sumsq)
gen e20__rt = e20/e20__sqrtsumsq
gen e22_sq = e22^2
egen e22_sumsq = total(e22^2)
gen e22_sqrtsumsq = sqrt(e22_sumsq)
gen e22_rt = e22/e22_sqrtsumsq
gen wrt = .
replace wrt = e18_rt if e18_rt!=.
replace wrt = e20__rt if e20__rt!=.
replace wrt = e22_rt if e22_rt!=.
tabstat e18_rt e20__rt e22_rt, stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub
//convert back to money
gen wtpr = wrt*e18_sqrtsumsq
list wtpr wss e18_s e20__s e22_s e18 e18_m e18_sd e20_ e20__m e20__sd e22 e22_m e22_sd if wtpr<0
tabstat wtpr, by(arm) stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub
*HH expenditure - ratio scale transformation
gen e17_sq = e17^2
egen e17_sumsq = total(e17^2)
gen e17_sqrtsumsq = sqrt(e17_sumsq)
gen e17_rt = e17/e17_sqrtsumsq
gen e19h__sq = e19h_^2
egen e19h__sumsq = total(e19h_^2)
gen e19h__sqrtsumsq = sqrt(e19h__sumsq)
gen e19h__rt = e19h/e19h__sqrtsumsq
gen e21e_sq = e21e^2
egen e21e_sumsq = total(e21e^2)
gen e21e_sqrtsumsq = sqrt(e21e_sumsq)
gen e21e_rt = e21e/e21e_sqrtsumsq
gen hrt = .
replace hrt = e17_rt if e17_rt!=.
replace hrt = e19h__rt if e19h__rt!=.
replace hrt = e21e_rt if e21e_rt!=.
tabstat e17_rt e19h__rt e21e_rt, stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub
//convert back to money
gen hexpr = hrt*e17_sqrtsumsq
tabstat hexpr, by(arm) stat(n min max p25 median p75 mean semean skew kurt) format(%10.1f) longstub
*WTP proportion of total expenditure (also standardised):
gen wtpr_prop = wtpr/hexpr
tabstat wtpr_prop, by(arm) stat(n min max p25 median p75 mean semean) format(%8.3f) longstub

//graphs of ratio scale standard scores, unconverted and converted back
//standard score wtp and hss
graph box wrt hrt, ytitle("Standard Score") over(arm) ///
title("Standard scores of Willingness To Pay and Household
```



```
Expenditure, by arm", size(small)) showyvars legend(off)
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_wss_hss.gph", replace
//standardised WTP in money
graph box wtpr, ytitle("Money (MKW)") over(arm) ///
title("Willingness to Pay, standardised in money, by arm", size(small)) showyvars legend(off)
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_wtp.gph", replace
//standardised Household Expenditure in money
graph box hexpr, ytitle("Money (MKW)") over(arm) ///
title("Household Expenditure, standardised in money, by arm", size(small)) showyvars legend(off)
graph save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV_hexp.gph", replace
summ wss hss //mean=0, standard deviation=1
summ wtp wtp_t wtp_u hexp hexp_t hexp_u

*Regressions
//WTP on total HH expenditure for each payment vehicle
*Money
regress e18 e17
gen e17k = e17/1000 //total HH expenditure in 1000s of Kwacha
regress e18 e17k //significant positive increase in absolute WTP by increase in HH expenditure (11.8K per 1000K; p=0.004)
regress e18 i.arm //absolute amount by arm - not significant
regress propWTP_m e17 //proportion by HH expenditure - borderline significant
regress propWTP_m e17k //those with more money are WTP very slightly less (but p=0.01) than those with less money
regress propWTP_m i.arm  //non-members and control women are willing to pay more
regress propWTP_m e17k i.arm //non-members and control women are willing to pay more, controlling for HH expenditure
*Time
regress e20 e19h
regress e20 e19h_
regress e20_ e19h_ //neither the uncorrected or the corrected time estimates and total expenditures are significantly associated
regress e20 i.arm
regress e20_ i.arm //corrected time is p=0.032 significantly lower in non-members than members, but uncorrected isn't
regress propWTP_t e19h //no relation between total time spend and WTP(time)
regress propWTP_t i.arm //WG members willing to give more time than non-members (uncorrected figures)
regress propWTP_t_ i.arm //difference between corrected figures not significant
regress propWTP_t_ e19h_  //no relation between total time spend and WTP(time)
regress propWTP_t_ e19h_ i.arm // no differences between study arms
*Ufa
```

```
regress e22 e21e
regress propWTP_u e21e
gen e21ek = e21e/10 //total HH expenditure in 10s of Kg of Ufa
regress e22 e21ek
regress propWTP_u e21ek //trend towards those with greater expenditure on ufa WTP less - but minor (-0.3% per 10Kg ufa: p=0.062)
regress propWTP_u i.arm
regress propWTP_u e21ek i.arm // no differences between study arms
*Standard Score - linear
regress wss hss //WTP standardised score is significantly associated with household expenditure standard score
regress wss i.arm //standardised score is not significantly different by arm
regress wss hss i.arm
*Standard Score - Ratio
regress wrt hrt //WTP standardised score is significantly associated with household expenditure standard score
regress wrt i.arm //standardised score is not significantly different by arm
regress wrt hrt i.arm
//Absolute vs. proportionate WTP
regress propWTP_m e18
regress propWTP_t e20
regress propWTP_t_ e20_
regress propWTP_t_ e20
regress propWTP_u e22
regress wtpr_prop wtpr

**Univariate Regressions - Socio-demographic and Contextual info
//have to be mindful of small numbers
foreach t in arm edu marital ill age b4 b8 c9 c10a c11 c12 e14 {
    tab `t'
    tab `t', nol
}
//WTP as absolute amount
foreach a in i.arm i.edu i.marital i.ill age b4 b8 i.c9 i.c10a c11 ib(3).c12 {
    foreach b in e18 e20 e20_ e22 wss wtp wrt wtpr {
    regress `b' `a'
}
}
regress wtp hexp
regress wtpr hexpr
//WTP as proportion of total expenditure
foreach a in i.arm i.edu i.marital i.ill age b4 b8 i.c9 i.c10a c11 ib(3).c12 {
    foreach b in propWTP_m propWTP_t propWTP_t_ propWTP_u wtp_prop wtpr_prop {
    regress `b' `a'
}
}
* ib(3).c12 means the base category is the third one, which is health
```



```
facility delivery (the most numerous by far n=91; can get value for this=constant(
regress wtp_prop hexp
regress wtpr_prop hexpr

**Multivariate regressions - Stepwise: start with including all p<0.25 from univariate and remove biggest p's untill only left with all p<0.05
//Absolute amount Money
regress e18 i.arm e17k i.edu i.c9 marital b4 b8 i.c10a c11 //i.c10a and c11 ommitted because of collinearity
regress e18 i.arm e17k i.edu i.c9 b4 b8 // this model has most coefficients between p=0.08 and p=0.12; perhaps useful? given what happens when any variable is removed however (see below), perhaps not
regress e18 e17k i.edu i.c9 b4 b8 //i.arm removed because it has highest average p-value (0.093 adn 0.321). This model has all high p-values though!
regress e18 i.arm e17k i.c9 b4 b8 //removing i.edu also leads to high p-values all round
regress e18 i.arm e17k i.edu b4 b8 //removing i.c9 also leads to high p-values all round
regress e18 i.arm e17k i.edu i.c9 b4 //removing b8 again leads to high p-values
regress e18 i.arm e17k i.edu i.c9 b8 //removing b4 also leads to high p-values
regress e18 i.arm i.edu i.c9 b4 b8 //removing e17k also leads to high p-values
//The following is sequential removal as originally planned:
regress e18 e17k i.edu i.c9 b4
regress e18 e17k i.edu i.c9
regress e18 e17k i.edu //final model retains total expenditure and education
//Absolute amount Time (uncorrected):
regress e20 i.arm ib(3).c12
regress e20 i.arm //nothing significant (perhaps unsurprising as uncorrected)
//Absolute amount Time (corrected):
regress e20_ i.arm i.edu i.c9 b8 i.c10a
regress e20_ i.arm i.edu i.c9 b8
regress e20_ i.arm i.c9 b8
regress e20_ i.arm b8
regress e20_ i.arm //only left with this, the univariate regression with i.arm
//Absolute Ufa:
regress e22 e21ek i.edu i.c9 i.ill b8 i.c10a c11
regress e22 e21ek i.edu i.c9 b8 i.c10a c11
regress e22 e21ek i.edu i.c9 b8 c11 //final model
//Absolute Standard Score (linear transformation):
regress wtp hexp i.c9 i.ill b8 c11
regress wtp hexp i.ill b8 c11
regress wtp hexp i.ill b8
regress wtp hexp i.ill
```

```
396 regress wtp hexp //only left with this, univariate regression with
    hexp
397 //Absolute Standard Score (ratio transformation):
398 regress wtpr hexpr b8 c11
399 regress wtpr hexpr b8
400 regress wtpr hexpr //only left with this, univariate regression with
    hexpr
401 //Percentage Money:
402 regress propWTP_m i.arm e17k i.c9 i.marital b4 i.c10a
403 regress propWTP_m i.arm e17k i.c9 i.marital i.c10a
404 regress propWTP_m i.arm e17k i.c9 i.marital
405 regress propWTP_m i.arm e17k i.c9 i.c10a
406 regress propWTP_m i.arm e17k i.c9 //final model
407 //Percentage Time (uncorrected):
408 regress propWTP_t i.arm e19h i.edu i.c9 i.c10a
409 regress propWTP_t i.arm e19h i.edu i.c9
410 regress propWTP_t i.arm i.edu i.c9
411 regress propWTP_t i.arm i.c9
412 regress propWTP_t i.arm //only left with this, the univariate
    regression with i.arm
413 //Percentage Time (corrected):
414 regress propWTP_t_ i.arm //not significant so no model remaining
415 //Percentage Ufa:
416 regress propWTP_u i.edu b8 c11 e21ek
417 regress propWTP_u i.edu c11 e21ek
418 regress propWTP_u c11 e21ek
419 regress propWTP_u e21ek //this is not significant so no model
    remaining
420 //Percentage Standard Score:
421 regress wtp_prop i.ill ib(3).c12
422 regress wtp_prop ib(3).c12 //not significant so no model remaining
423 regress wtp_prop i.ill //not significant so no model remaining
424 //Absolute Standard Score (ratio transformation):
425 regress wtpr_prop hexpr i.edu i.c9 b4 b8
426 regress wtpr_prop hexpr i.edu i.c9 b8
427 regress wtpr_prop hexpr i.c9 b8
428 regress wtpr_prop hexpr b8
429 regress wtpr_prop b8
430 regress wtpr_prop hexpr //only left with this, univariate regression
    with hexpr
431
432 save "/Users/timothycolbourn/Dropbox/Tim's PhD/CV/CV.dta", replace
433 log close
434
```